

MICROSOFT
AZURE
FUNDAMENTALS

Complete Overview of my Reseaarch Before exam



SURAJ KUMAR NANDA
Cloud Technology Enthusiast | An Elephant Lover



Serial No.	Content
1	Cloud Concepts
2	Azure Services
3	Security, Privacy, Compliance, and Trust
4	Azure Pricing, Service Level Agreements, and Lifecycles

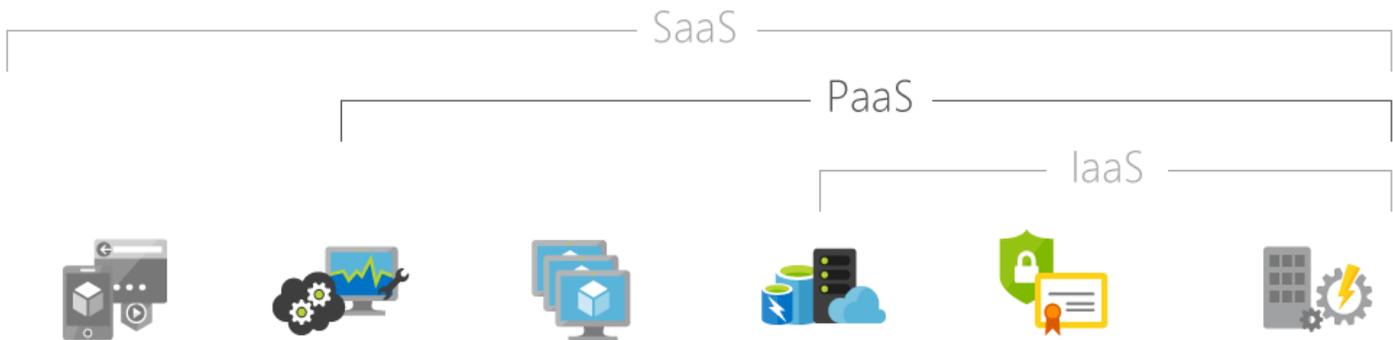
CLOUD CONCEPTS

What are the different types of cloud computing services?

Cloud computing types are service deployment models that let you choose the level of control over your information and the types of services you need to provide. There are three main types of cloud computing services, sometimes called the cloud computing stack because they are built on top of one another.

- ✚ The first cloud computing type is infrastructure as a service (IaaS), which is used for Internet-based access to storage and computing power. The most basic category of cloud computing types, IaaS lets you rent IT infrastructure – servers and virtual machines, storage, networks and operating systems – from a cloud provider on a pay-as-you-go basis.
- ✚ The second cloud computing type is platform as a service (PaaS) that gives developers the tools to build and host web applications. PaaS is designed to give users access to the components they require to quickly develop and operate web or mobile applications over the Internet, without worrying about setting up or managing the underlying infrastructure of servers, storage, networks and databases.
- ✚ The third cloud computing type is software as a service (SaaS) which is used for web-based applications. SaaS is a method for delivering software applications over the Internet through which cloud providers host and manage the software applications, making it easier to have the same application on all of your devices at once by accessing it in the cloud.

Describe the differences between Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS)



Platform as a service (PaaS)

Platform as a service (PaaS) is a complete development and deployment environment in the cloud, with resources that enable you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications. You purchase the resources you need from a cloud service provider on a pay-as-you-go basis and access them over a secure Internet connection.

PaaS allows you to avoid the expense and complexity of buying and managing software licenses, the underlying application infrastructure and middleware, container orchestrators such as Kubernetes or the development tools and other resources. You manage the applications and services that you develop, and the cloud service provider typically manages everything else.

Advantages of PaaS

By delivering infrastructure as a service, PaaS offers the same advantages as IaaS. But its additional features (middleware, development tools and other business tools) give you more advantages:

- ✚ Cut coding time. PaaS development tools can cut the time it takes to code new apps with pre-coded application components built into the platform, such as workflow, directory services, security features, search and so on.

- ✚ Add development capabilities without adding staff. Platform as a Service components can give your development team new capabilities without your needing to add staff with the required skills.
- ✚ Develop for multiple platforms – including mobile – more easily. Some service providers give you development options for multiple platforms, such as computers, mobile devices and browsers, making cross-platform apps quicker and easier to develop.
- ✚ Use sophisticated tools affordably. A pay-as-you-go model makes it possible for individuals or organizations to use sophisticated development software and business intelligence and analytics tools that they could not afford to purchase outright.
- ✚ Support geographically distributed development teams. Because the development environment is accessed over the Internet, development teams can work together on projects, even when team members are in remote locations.
- ✚ Efficiently manage the application life cycle. PaaS provides all of the capabilities that you need to support the complete web application life cycle: building, testing, deploying, managing and updating within the same integrated environment.

Common PaaS scenarios

Organizations typically use PaaS for these scenarios:

Development framework PaaS provides a framework that developers can build upon to develop or customize cloud-based applications. Similar to the way you create an Excel macro, PaaS lets developers create applications using built-in software components. Cloud features such as scalability, high-availability and multi-tenant capability are included, reducing the amount of coding that developers must do.

Analytics or business intelligence Tools provided as a service with PaaS allow organizations to analyze and mine their data, finding insights and patterns and predicting outcomes to improve forecasting, product design decisions, investment returns and other business decisions.

Additional services PaaS providers may offer other services that enhance applications, such as workflow, directory, security and scheduling.

Software as a service (SaaS)

Software as a service (SaaS) allows users to connect to and use cloud-based apps over the Internet. Common examples are email, calendaring and office tools (such as Microsoft Office 365).

SaaS provides a complete software solution that you purchase on a pay-as-you-go basis from a cloud service provider. You rent the use of an app for your organization, and your users connect to it over the Internet, usually with a web browser. All of the underlying infrastructure, middleware, app software and app data are located in the service provider's data Centre. The service provider manages the hardware and software, and with the appropriate service agreement, will ensure the availability and the security of the app and your data as well. SaaS allows your organization to get up and running quickly with an app, at minimal upfront cost.

Common SaaS scenarios

If you've used a web-based email service such as Outlook, Hotmail or Yahoo! Mail, then you've already used a form of SaaS. With these services, you log in to your account over the Internet, often from a web browser. The email software is located on the service provider's network, and your messages are stored there as well. You can access your emails and stored messages from a web browser on any computer or Internet-connected device.

The previous examples are free services for personal use. For organizational use, you can rent productivity apps, such as email, collaboration and calendaring apps; and sophisticated business applications such as customer relationship management (CRM), enterprise resource planning (ERP) and document management applications. You pay for the use of these apps by subscription or according to the level of use.

Advantages of SaaS

- ✚ Gain access to sophisticated applications. To provide SaaS apps to users, you don't need to purchase, install, update or maintain any hardware, middleware or software. SaaS makes even sophisticated enterprise applications, such as ERP and CRM, affordable for

organizations that lack the resources to buy, deploy and manage the required infrastructure and software themselves.

- ✚ Only pay for what you use. You also save money because the SaaS service automatically scales up and down according to the level of usage.
- ✚ Use free client software. Users can run most SaaS apps directly from their web browser without needing to download and install any software, although some apps require plug-ins. This means that you don't need to purchase and install special software for your users.
- ✚ Mobilize your workforce easily. SaaS makes it easy to “mobilize” your workforce because users can access SaaS apps and data from any Internet-connected computer or mobile device. You don't need to worry about developing apps to run on different types of computers and devices because the service provider has already done so. In addition, you don't need to bring special expertise onboard to manage the security issues inherent in mobile computing. A carefully chosen service provider will ensure the security of your data, regardless of the type of device consuming it.
- ✚ Access app data from anywhere. With data stored in the cloud, users can access their information from any Internet-connected computer or mobile device. And when app data is stored in the cloud, no data is lost if a user's computer or device fails.

Infrastructure as a service (IaaS)

Infrastructure as a service (IaaS) is a form of cloud computing that provides virtualized computing resources over the internet. IaaS is one of the three main categories of cloud computing services, alongside software as a service (SaaS) and platform as a service (PaaS).

Common IaaS business scenarios

Typical things businesses do with IaaS include:

- ✚ **Test and development.** Teams can quickly set up and dismantle test and development environments, bringing new applications to market faster. IaaS makes scaling dev-test environments up and down quick and economical.

- ✚ **Website hosting.** Running websites using IaaS can be less expensive than traditional web hosting.
- ✚ **Storage, backup and recovery.** Organizations avoid the capital outlay for storage and complexity of storage management, which typically requires skilled staff to manage data and meet legal and compliance requirements. IaaS is useful for handling unpredictable demand and steadily growing storage needs. It can also simplify the planning and management of backup and recovery systems.
- ✚ **Web apps.** IaaS provides all the infrastructure to support web apps, including storage, web and application servers, and networking resources. Organizations can quickly deploy web apps on IaaS and easily scale infrastructure up and down when demand for the apps is unpredictable.
- ✚ **High-performance computing.** High-performance computing (HPC) on supercomputers, computer grids or computer clusters helps solve complex problems involving millions of variables or calculations. Examples include earthquake and protein folding simulations, climate and weather predictions, financial modelling and evaluating product designs.
- ✚ **Big data analysis.** Big data is a popular term for massive data sets that contain potentially valuable patterns, trends and associations. Mining data sets to locate or tease out these hidden patterns requires a huge amount of processing power, which IaaS provides economically.

Advantages of IaaS

Eliminates capital expense and reduces ongoing cost. IaaS sidesteps the upfront expense of setting up and managing an on-site data centre, making it an economical option for start-ups and businesses testing new ideas.

Improves business continuity and disaster recovery. Achieving high availability, business continuity and disaster recovery is expensive, as it requires a significant amount of technology and staff. But with the right service level agreement (SLA) in place, IaaS can reduce this cost, meaning you can access applications and data as usual during a disaster or outage.

Innovate rapidly. As soon as you've decided to launch a new product or initiative, the necessary computing infrastructure can be ready in minutes or hours, rather than the days or weeks (and sometimes months) it could take to set up internally.

Respond more quickly to shifting business conditions. IaaS enables you to quickly scale up resources to accommodate spikes in demand for your application – during the holidays, for example – then scale resources back down again when activity decreases to save money.

Focus on your core business. IaaS frees up your team to focus on your organization’s core business rather than on IT infrastructure.

Increase stability, reliability and supportability. With IaaS, there’s no need to maintain and upgrade software and hardware or troubleshoot equipment problems. With the appropriate agreement in place, the service provider ensures that your infrastructure is reliable and meets SLAs.

Better security. With the appropriate service agreement, a cloud service provider can provide security for your applications and data that may be better than what you can attain in-house.

Gets new apps to users faster. Because you don’t need to first set up the infrastructure before you can develop and deliver apps, you can get them to users faster with IaaS.

[Describe the differences between Public, Private and Hybrid cloud models](#)

Public cloud

The public cloud is defined as computing services offered by third-party providers over the public Internet, making them available to anyone who wants to use or purchase them. They may be free or sold on-demand, allowing customers to pay only per usage for the CPU cycles, storage, or bandwidth they consume.

Private cloud

A private cloud is a computing environment for a specific organization, featuring public cloud benefits but hosted in a company’s datacenter or via a third-party provider. Private clouds are known for their reliability, scalability, and security, and therefore are often the choice infrastructure option for enterprise workloads.

Hybrid cloud

A hybrid cloud is a computing environment that combines a public cloud and a private cloud by allowing data and applications to be shared between them. When computing and processing

demand fluctuates, hybrid cloud computing gives businesses the ability to seamlessly scale their on-premises infrastructure up to the public cloud to handle any overflow – without giving third-party data centers access to the entirety of their data. Organizations gain the flexibility and computing power of the public cloud for basic and non-sensitive computing tasks, while keeping business-critical applications and data on premises, safely behind a company firewall.

Using a hybrid cloud not only allows companies to scale computing resources, but it also eliminates the need to make massive capital expenditures to handle short-term spikes in demand, as well as when the business needs to free up local resources for more sensitive data or applications. Companies will only pay for the resources they temporarily use instead of having to purchase, program and maintain additional resources and equipment that could remain idle over long periods of time. Hybrid cloud computing is a “best of all possible worlds” platform, delivering all the benefits of cloud computing – flexibility, scalability and cost efficiencies – with the lowest possible risk of data exposure. Read more about hybrid cloud capabilities and getting started with Azure.

Private cloud vs. public cloud vs. hybrid cloud

A public cloud is delivered through an independent, third-party vendor. Most popularly, Amazon Web Services (AWS) and Microsoft Azure dominate the market for public cloud. Companies like these maintain compute resources that their customers can utilize when needed. Businesses who use the public cloud share these resources. This is commonly referred to as a “multi-tenant” environment.

On the opposite end of the spectrum, a business can create, own, operate, and maintain their own private cloud. While there is more security in this format, on-premises cloud architectures aren't always the most flexible or scalable because the organization must depend on the resources, they already have rather than a third-party vendor's resources.

Many businesses have realized the benefits of both public and private clouds, and have thus moved on to adopt a hybrid cloud model. In this architecture, a private cloud connects with a public cloud, letting businesses run resource-intensive workloads in both worlds. Commonly, the business will primarily use their private cloud environment, and then “burst” into the public cloud when needed. For a hybrid cloud-based model to work, there must be a high level of compatibility between the software that runs the clouds and the services used in both.

Azure architectural components

Azure Regions

An Azure region is a set of datacenters that's deployed within a latency-defined perimeter. This set of datacenters is connected through a dedicated regional low latency network.

With roughly 42 regions already deployed, and another 12 planned, Azure provides flexibility to deploy applications where they are needed.

Azure operates in several geographies around the world. An Azure geography is a defined area of the world where at least one Azure region exists. An Azure region itself is an area within a geography that contains one or more datacenters.

Every region that exists is paired with another region in the same geography. This is called regional pairing. Regional pairs allow Azure to serialize platform updates and maintenance so that only one paired region is updated at a time. In addition, in the event of an outage that affects multiple regions, at least one region in each pair is prioritized by Azure for recovery.

Microsoft recommends that organizations configure business continuity so that it spans across regional pairs in order to benefit from Azure's isolation and availability policies that are based on regional pairs.

Applications that support multiple active regions should use both regions in a regional pair when possible. This ensures optimal availability for applications that are hosted there and minimizes recovery time in the event of a disaster.

Availability Zones

MS azure offers a feature called availability zones. Availability zones is an HA offering that protects applications and data from datacenter failures. An availability zone is a unique physical location within an azure region. Each availability zone is made up of one or more data centers that are equipped with their own power, cooling, and networking equipment.

To provide resiliency, there are a minimum of three separate zones in all azure regions. The physical separation of each availability zone within each region is what protects applications and data from datacenter failures in azure. There are zone redundant services that replication applications and data across these available zones in order to protect them from single points of failure.

Availability zones offer a 99.99% VM uptime SLA. An availability zone within an azure region consists of a combination of a fault domain and an update domain. For example, if you create 3 or more VMs that span across three zones within a region, those VMs are distributed across 3 fault domains and 3 update domains. Azure recognizes this distribution and ensures that VMs in different availability zones are not updated at the same time. This is what provides the availability that availability zones offer.

Resource Groups

A resource group is a container in azure that holds related resources that are part of an azure solution. An azure resource group can include all resources that are part of an azure solution or only resources that need to be managed as a group. You can decide how to allocate resources in resource groups, based on organizational needs.

There are a few key factors to consider when deploying and defining resource groups. For example, all resources within a resource group should share the same lifecycle. You would typically deploy, update, and delete resource within a resource group together. For example, if a DB server resides in a resource group but needs to exist on a different lifecycle than everything else in the resource group, the DB server should probably belong to a different resource group that share the same deployment cycle.

Each resource, by the way, can only exist in one resource group. As far as adding, moving, and removing resources goes, you can add and remove resources to/from a resource group at any time. You can also move resources between resource groups.

A resource group can also contain resources from multiple regions. A key function of the resource group is ability to scope access control to resources within it for admin action. Be it resource management, billing, etc.

Just because a resource resides in on resource group doesn't mean it can't interact with resources from another resource group. This is quite common. For example, web applications in one resource group may interact with a database in another resource group.

When creating a resource group, you need to provide some key information, including a location for the resource group. This is necessary because the resource group stores metadata about resources within it. As such, when you specify a location for the resource group, this tells Azure where to save this meta data. Organizations with certain compliance requirements may need to ensure that data is stored in a specific region. This is an important consideration when choosing where to deploy a resource group and associated resources.

Azure Resource Manager

The infrastructure for an application that's been deployed in Azure is typically made up of several different components. For example, it may consist of a virtual machine that runs the app, a storage account that hosts storage for the application, a web app that serves as the front end for the app, and maybe a database.

You will often want to deploy, manage, and monitor all of these resources as a group. Azure Resource Manager is a tool that allows you to work with all of the resources that are part of a solution as a group. The Resource Manager allows you to deploy, update, or delete all of a solution's resources in a single, coordinated operation. It also allows you to leverage templates for deployment. Such templates can then be used to deploy different environments such as testing, staging, and production.

Essentially, Resource Manager offers a consistent management layer for all resources, while providing security, auditing, and tagging features that can help you manage your resources once they've been deployed. With Resource Manager, you can deploy, manage, and monitor all the resources for a particular solution as one group, instead of managing them individually. You can also apply access controls to all services in a resource group, using Resource Manager, because Role-Based Access Control is natively integrated into the platform.

Other helpful benefits of the Resource Manager include the ability to apply tags to resources, so you can logically organize them within your subscription. Tags also help you to clarify your organization's billing by allowing you to view costs for a group of resources that share the same tag.

Core products available in Azure

❖ *Products available for Compute such as:*

 Windows Virtual Machine

Follow this link- <https://docs.microsoft.com/en-ca/azure/virtual-machines/windows/overview>

 Linux Virtual Machine

Follow this link- <https://docs.microsoft.com/en-ca/azure/virtual-machines/linux/overview>

 Scale Sets

Follow this link- <https://docs.microsoft.com/en-us/azure/virtual-machine-scale-sets/overview>

 App Services

Follow this link- <https://docs.microsoft.com/en-us/azure/app-service/>

 Azure Functions

Follow this link- <https://docs.microsoft.com/en-us/azure/azure-functions/functions-overview>

 Azure Container Instances (ACI)

Follow this link- <https://docs.microsoft.com/en-us/azure/container-instances/>

 Azure Kubernetes Service (AKS)

Follow this link- <https://azure.microsoft.com/en-in/services/kubernetes-service/>

❖ *Products available for Networking such as:*

 Virtual Network

Follow this link- <https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-overview>

 Load Balancer

Follow this link- <https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-overview>

 VPN Gateway

Follow this link- <https://docs.microsoft.com/en-us/azure/vpn-gateway/vpn-gateway-about-vpngateways>

Application Gateway

Follow this link- <https://docs.microsoft.com/en-us/azure/application-gateway/overview>

❖ *Products available for Storage such as:*

Blob Storage

Azure Blob storage is Microsoft's object storage solution for the cloud. Blob storage is optimized for storing massive amounts of unstructured data. Unstructured data is data that doesn't adhere to a particular data model or definition, such as text or binary data.

Disk Storage, File Storage & Archive Storage

Follow this link- <https://docs.microsoft.com/en-us/azure/virtual-machines/managed-disks-overview>

❖ *Products available for Database such as:*

Azure Cosmos DB

Today's applications are required to be highly responsive and always online. To achieve low latency and high availability, instances of these applications need to be deployed in datacenters that are close to their users. Applications need to respond in real time to large changes in usage at peak hours, store ever increasing volumes of data, and make this data available to users in milliseconds.

Follow this link- <https://docs.microsoft.com/en-us/azure/cosmos-db/introduction>

Azure SQL Database | Azure Databasae for MySQL | Azure Database for PostgreSQL

SQL Azure is Microsoft's cloud database service. Based on SQL Server database technology and built on Microsoft's Windows Azure cloud computing platform, SQL Azure enables organizations to store relational data in the cloud and quickly scale the size of their databases up or down as business needs change. Data is hosted, managed and provisioned in Microsoft data centers.

Organizations can build applications on-premises and move them to SQL Azure or build them on Windows Azure and keep the data in the cloud. SQL Azure supports SQL Server's Transact-SQL (T-SQL) query language, offers built-in support for high availability and fault tolerance and allows for data to be synchronized between on-premises SQL Server and cloud databases.

Azure Marketplace- <https://azuremarketplace.microsoft.com/en-us/about>

AZURE SOLUTIONS

Internet of Things (IoT) and products that are available for IoT on Azure such as:

-  IoT Fundamentals
-  IoT Hub
-  IoT Central

Big Data and Analytics and products that are available for Big Data and Analytics such as:

-  Azure Synapse Analytics
-  HDInsight
-  Azure Databricks

Artificial Intelligence (AI) and products that are available for AI such as:

-  Azure Machine Learning Service
-  Azure Machine Learning Studio

Serverless computing and Azure products that are available for serverless computing such as:

-  Azure Functions
-  Logic Apps
-  Event grid

AZURE MANAGEMENT TOOLS

❖ Azure tools such as:

-  Azure Portal

The Azure portal is a web-based, unified console that provides an alternative to command-line tools. With the Azure portal, you can manage your Azure subscription using a graphical user interface. You can build, manage, and monitor everything from simple web apps to complex cloud deployments. Create custom dashboards for an organized view of resources. Configure accessibility options for an optimal experience.

The Azure portal is designed for resiliency and continuous availability. It has a presence in every Azure datacenter. This configuration makes the Azure portal resilient to individual datacenter failures and avoids network slow-downs by being close to users. The Azure portal updates continuously and requires no downtime for maintenance activities.

Azure PowerShell

<https://docs.microsoft.com/en-us/powershell/azure/?view=azps-3.8.0&viewFallbackFrom=azps-1.6.0>

Azure CLI

<https://docs.microsoft.com/en-us/cli/azure/?view=azure-cli-latest>

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 access the Cloud Shell in three ways:

- **Direct link:** Open a browser to <https://shell.azure.com>.
- **Azure portal:** Select the Cloud Shell icon on the [Azure portal](#):



- **Code snippets:** On docs.microsoft.com and [Microsoft Learn](#), select the **Try It** button that appears with Azure CLI and Azure PowerShell code snippets:

Azure CLICopy

Try It

`az account show`

Azure PowerShellCopy

Try It

`Get-AzSubscription`

The **Try It** button opens the Cloud Shell directly alongside the documentation using Bash (for Azure CLI snippets) or PowerShell (for Azure PowerShell snippets).

To run the command, use **Copy** in the code snippet, use **Ctrl+Shift+V** (Windows/Linux) or **Cmd+Shift+V** (macOS) to paste the command, and then press **Enter**.

Features

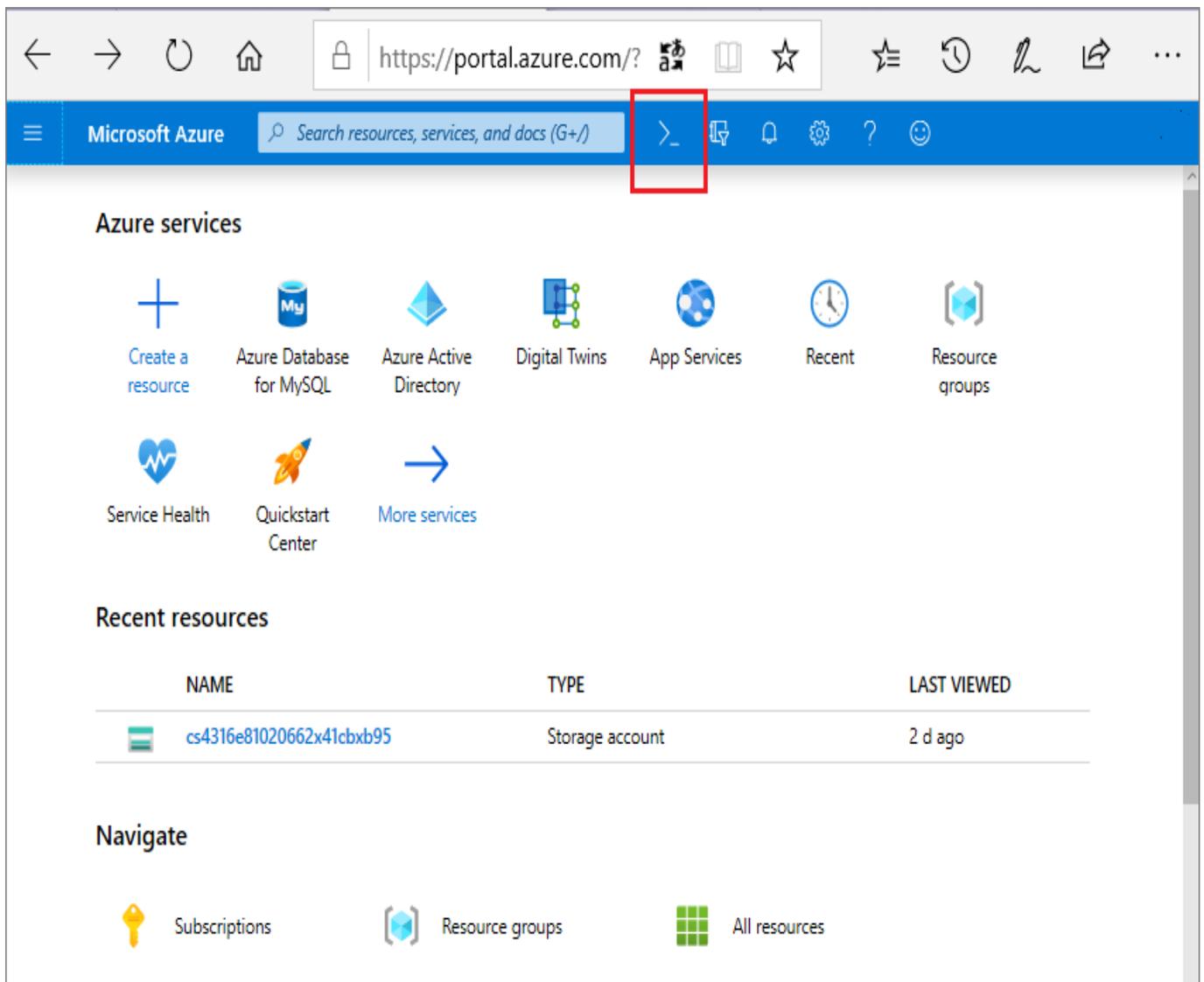
Browser-based shell experience

Cloud Shell enables access to a browser-based command-line experience built with Azure management tasks in mind. Leverage Cloud Shell to work untethered from a local machine in a way only the cloud can provide.

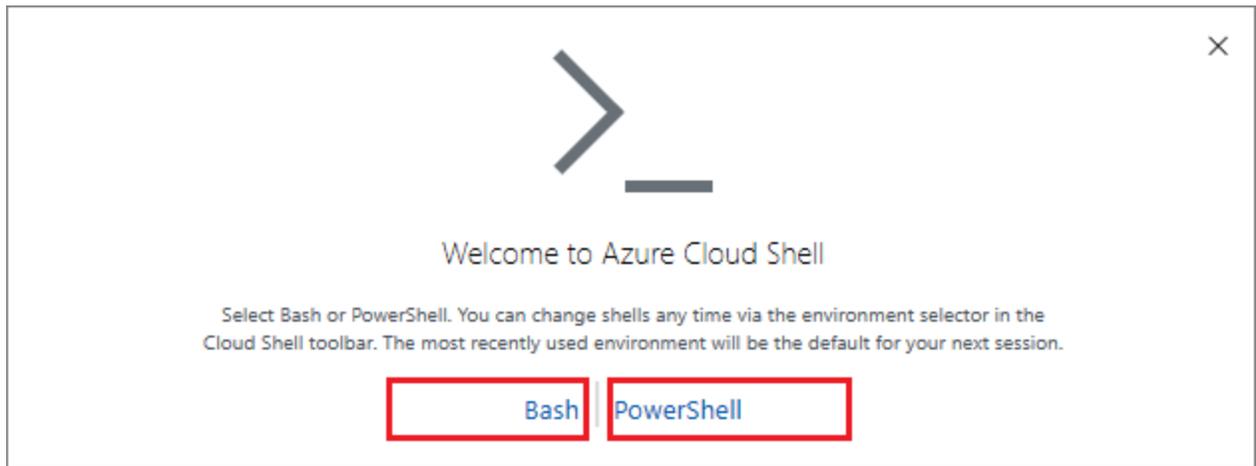
Choice of preferred shell experience

Users can choose between Bash or PowerShell.

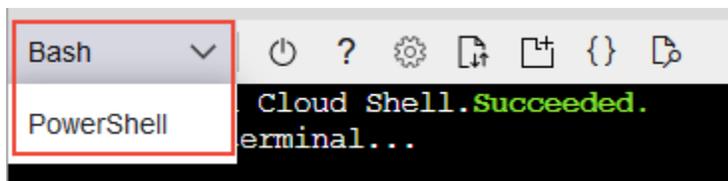
1. Select **Cloud Shell**.



2. Select **Bash** or **PowerShell**.



After first launch, you can use the shell type drop-down control to switch between Bash and PowerShell:



❖ ***Azure Advisor***

Advisor is a personalized cloud consultant that helps you follow best practices to optimize your Azure deployments. It analyzes your resource configuration and usage telemetry and then recommends solutions that can help you improve the cost effectiveness, performance, Reliability (formerly called High availability), and security of your Azure resources.

With Advisor, you can:

Get proactive, actionable, and personalized best practices recommendations.

Improve the performance, security, and reliability of your resources, as you identify opportunities to reduce your overall Azure spend.

Get recommendations with proposed actions inline.

You can access Advisor through the Azure portal. Sign in to the portal, locate Advisor in the navigation menu, or search for it in the All services menu.

SECURITY, PRIVACY, COMPLIANCE, AND TRUST

Follow This link' pdf- <https://download.microsoft.com/download/1/6/0/160216AA-8445-480B-B60F-5C8EC8067FCA/WindowsAzure-SecurityPrivacyCompliance.pdf>

AZURE PRICING, SERVICE LEVEL AGREEMENTS, AND LIFECYCLES

Follow this free course's video from Cloud Academy:

<https://cloudacademy.com/course/understanding-azure-pricing-and-support/service-level-agreements/>

