Microsoft Azure Cloud Services

SummitWorks™
GLOBAL SOLUTION ARCHITECTS

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Introduction to Cloud Computing and Microsoft Azure

Cloud computing overview

Cloud computing can be referred to as the storing and accessing of data over the internet rather than your computer's hard drive. This means you don't access the data from either your computer's hard drive or over a dedicated computer network (home or office network). Cloud computing means data is stored at a remote place and is synchronized with other web information.

One prominent example of cloud computing is Office 365 which allows users to store, access, edit their MS Office documents online (in browser) without installing the actual program on their device.

Cloud computing overview

Music evolution:





Photography evolution:


Storage evolution:

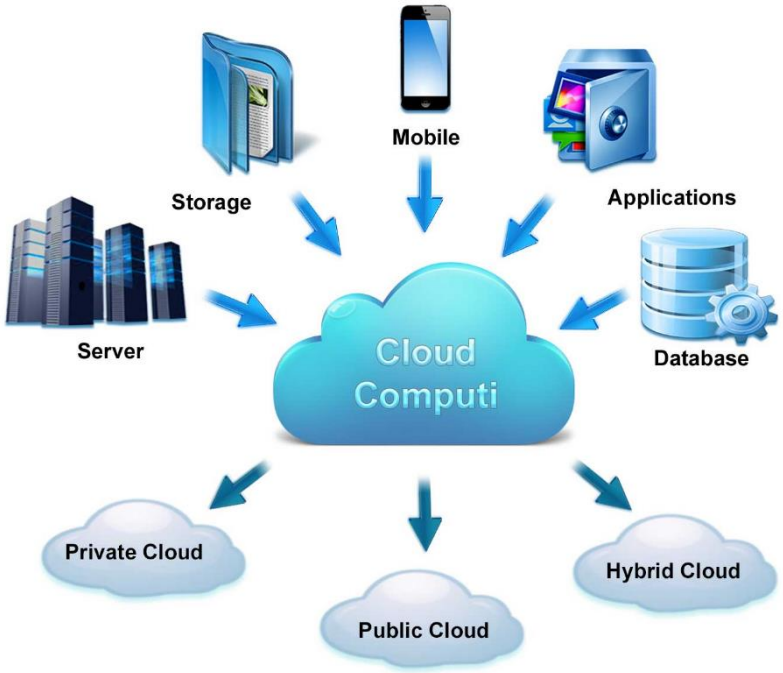




Cloud computing overview

Cloud computing refers to two concepts

Virtualization: Manage/share resources in a centralized way.



Abstraction: The information is stored in unknown places

Architecture of Cloud Computing

The architecture of cloud computing comprises of the following components:

Front-end device

Back-end platform

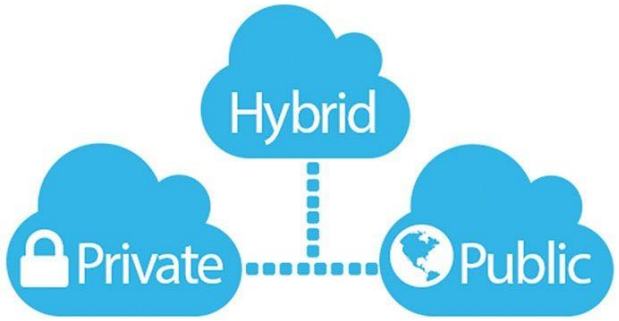
Cloud-based delivery

Network

Types of Cloud

The storage options on cloud is in 3 forms:

- Public
- Private
- Hybrid



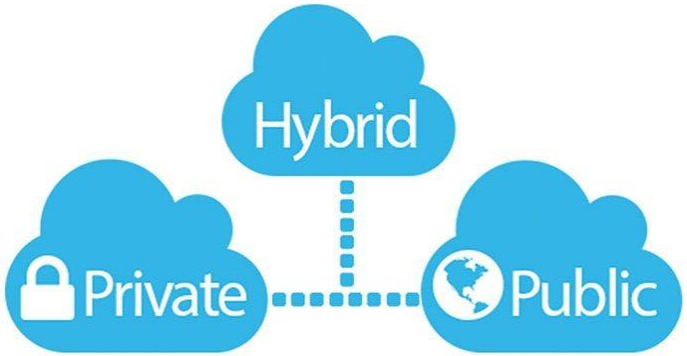
Public Cloud

A service provider makes the clouds available to the general public which is termed as a public cloud. These clouds are accessed through internet by users. These are open to public and their infrastructure is owned and operated by service providers as in case of Google and Microsoft.

Types of Cloud

Private Cloud

These clouds are dedicated to a particular organization. That particular organization can use the cloud for storing the company's data, hosting business application, etc. The data stored on private cloud can't be shared with other organizations. The cloud is managed either by the organization itself or by the third party.



Hybrid Cloud

When two or more clouds are bound together to offer the advantage of both public and private clouds, they are termed as Hybrid Cloud. Organizations can use private clouds for sensitive application, while public clouds for non-sensitive applications. The hybrid clouds provide flexible, scalable and cost-effective solutions to the organizations.

Benefits of Cloud

- Cloud service offers ***scalability***. Allocation and de-allocation of resources is dynamically as per demand.
- It ***saves on cost*** by reducing capital infrastructure.
- It ***allows the user to access*** the application independent of their ***location*** and hardware configuration.
- It ***simplifies the network*** and lets the client access the application ***without buying license*** for individual machine.
- ***Storing data*** on clouds is ***more reliable*** as it is not lost easily.

Disadvantages of Cloud

- Internet connection is required to access to your Cloud.
- Trust in your Cloud provider.
- You will not have any security layer control.
- Your data may be shared to others.
- Interface can be changed/updated anytime.
- User overloading.
- Some providers offer a small storage amount.

Types of Cloud Computing

There are three basic types of cloud services:

IaaS

Infrastructure-as-a-Service

host

PaaS

Platform-as-a-Service

build

SaaS

Software-as-a-Service

consume

IaaS

Infrastructure-as-a-Service

Provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc. Apart from these resources, the IaaS also offers:

- Virtual machine disk storage
- Virtual local area network (VLANs)
- Load balancers
- IP addresses
- Software bundles

All of the above resources are made available to end user via **server virtualization.** Moreover, these resources are accessed by the customers as if they own them.

IaaS Characteristics

- Virtual machines with pre-installed software.
- Virtual machines with pre-installed operating systems such as Windows, Linux, and Solaris.
- On-demand availability of resources.
- Allows to store copies of particular data at different locations.
- The computing resources can be easily scaled up and down.

PaaS

Platform-as-a-Service

Offers the runtime environment for applications. It also offers development and deployment tools required to develop applications. PaaS has a feature of **point-and-click** tools that enables non-developers to create web applications.

- **App Engine of Google** and **Force.com** are examples of PaaS offering vendors. Developer may log on to these websites and use the **built-in API** to create web-based applications.

But the disadvantage of using PaaS is that, the developer **locks-in** with a particular vendor. For example, an application written in Python against API of Google, and using App Engine of Google is likely to work only in that environment.

PaaS

Platform-as-a-Service

build

PaaS Characteristics

PaaS Characteristics

- PaaS offers **browser based development environment.** It allows the developer to create database and edit the application code either via Application Programming Interface or point-and-click tools.
- PaaS provides **built-in security, scalability,** and **web service interfaces.**
- PaaS provides built-in tools for defining **workflow, approval processes,** and business rules.
- It is easy to integrate PaaS with other applications on the same platform.
- PaaS also provides web services interfaces that allow us to connect the applications outside the platform.

SaaS

Software-as–a-Service (SaaS)

Model allows to provide software application as a service to the end users. It refers to a software that is deployed on a host service and is accessible via Internet. There are several SaaS applications:

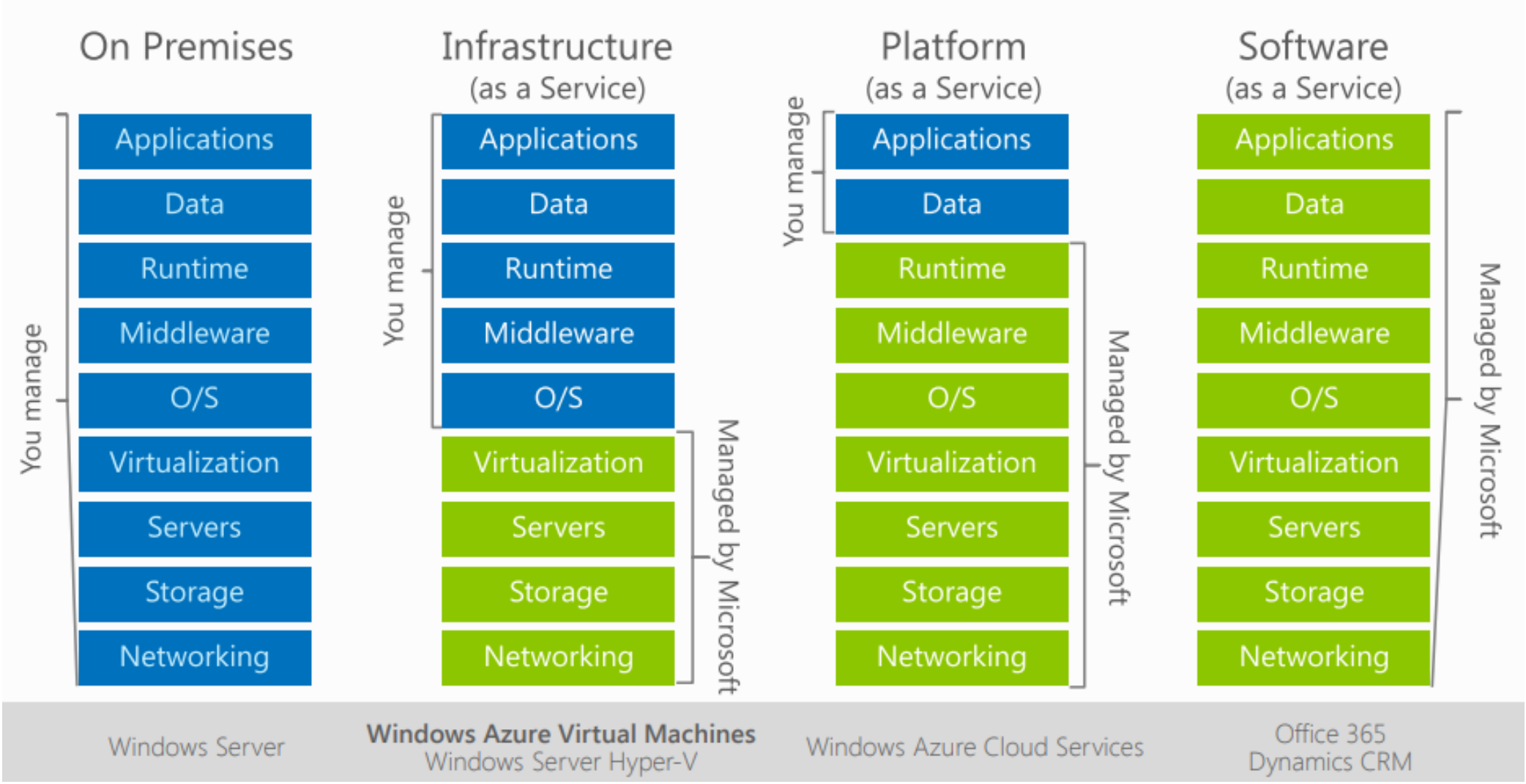
- Billing and invoicing system
- Customer Relationship Management (CRM) applications
- Help desk applications
- Human Resource (HR) solutions

Some of the SaaS applications are not customizable such as **Microsoft Office Suite.** But SaaS provides us **Application Programming Interface (API),**which allows the developer to develop a customized application.

SaaS Characteristics

- SaaS makes the software available over the Internet.
- The software applications are maintained by the vendor.
- The license to the software may be subscription based or usage based. And it is billed on recurring basis.
- SaaS applications are cost-effective since they do not require any maintenance at end user side.
- They are available on demand.
- They can be scaled up or down on demand.
- They are automatically upgraded and updated.
- SaaS offers shared data model. Therefore, multiple users can share single instance of infrastructure. It is not required to hard code the functionality for individual users.
- All users run the same version of the software.

IaaS/PaaS/SaaS



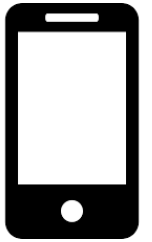
What is Microsoft Azure?

There are many cloud computing platforms offered by different organizations. Windows Azure is one of them, which is provided by Microsoft. ***Azure can be described as the managed data centers that are used to build, deploy, manage the applications and provide services through a global network.*** The services provided by Microsoft Azure are PaaS and IaaS. Many programming languages and frameworks are supported by it.

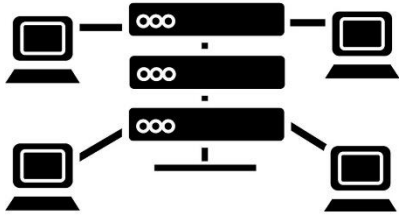
Microsoft Azure Advantages

Designed for any size Companies

Allows you to create servers



Develop apps



Build your infrastructure immediately

On demand Processing Power

Rental services

Azure key concepts

Data Centers and Regions

Microsoft has datacenters all over the world from where Windows Azure services are managed. Datacenters are divided in regions. The exact location of these datacenters is not revealed by Microsoft for obvious security reasons.

How to choose the right Data Center

When creating Windows Azure application, whether it is mobile application, web application or database storage it asks to specify the region. Region here specifies a regional datacenter.

Performance: You should select the nearest datacenter to the users of your application. The performance can be affected by the relative location of the users who want to access the application. If a user is closer to the datacenter, the performance will be better.

Cost: The price of hosting the application may also increase or decrease depending upon the datacenter you choose. Price actually can vary according to the database hosting location or any other service being used by the application. You should choose the same location for all the services that are being used by your application. For example, database or any media service. If they are kept in separate datacenter there will be charges per transaction, but anything extra won't be charged if they are kept at the same datacenter.

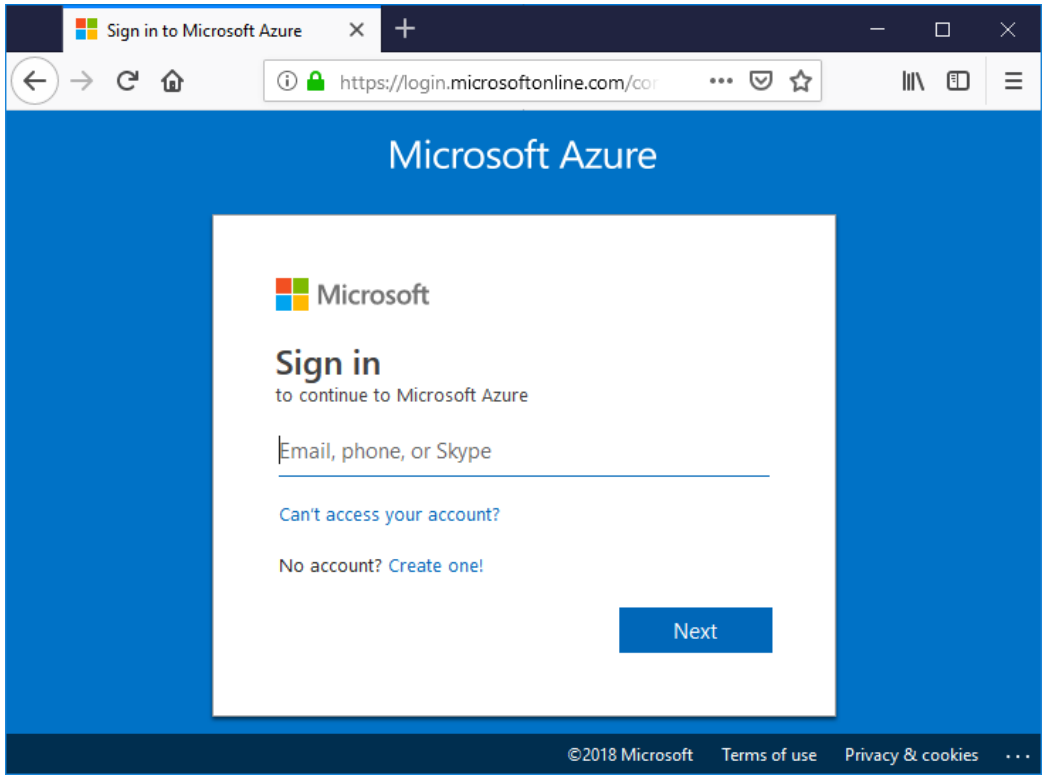
Legal Aspect: Laws vary from country to country and restrictions could be enforced in some regions on what information can be shared and what cannot.

Azure Portal

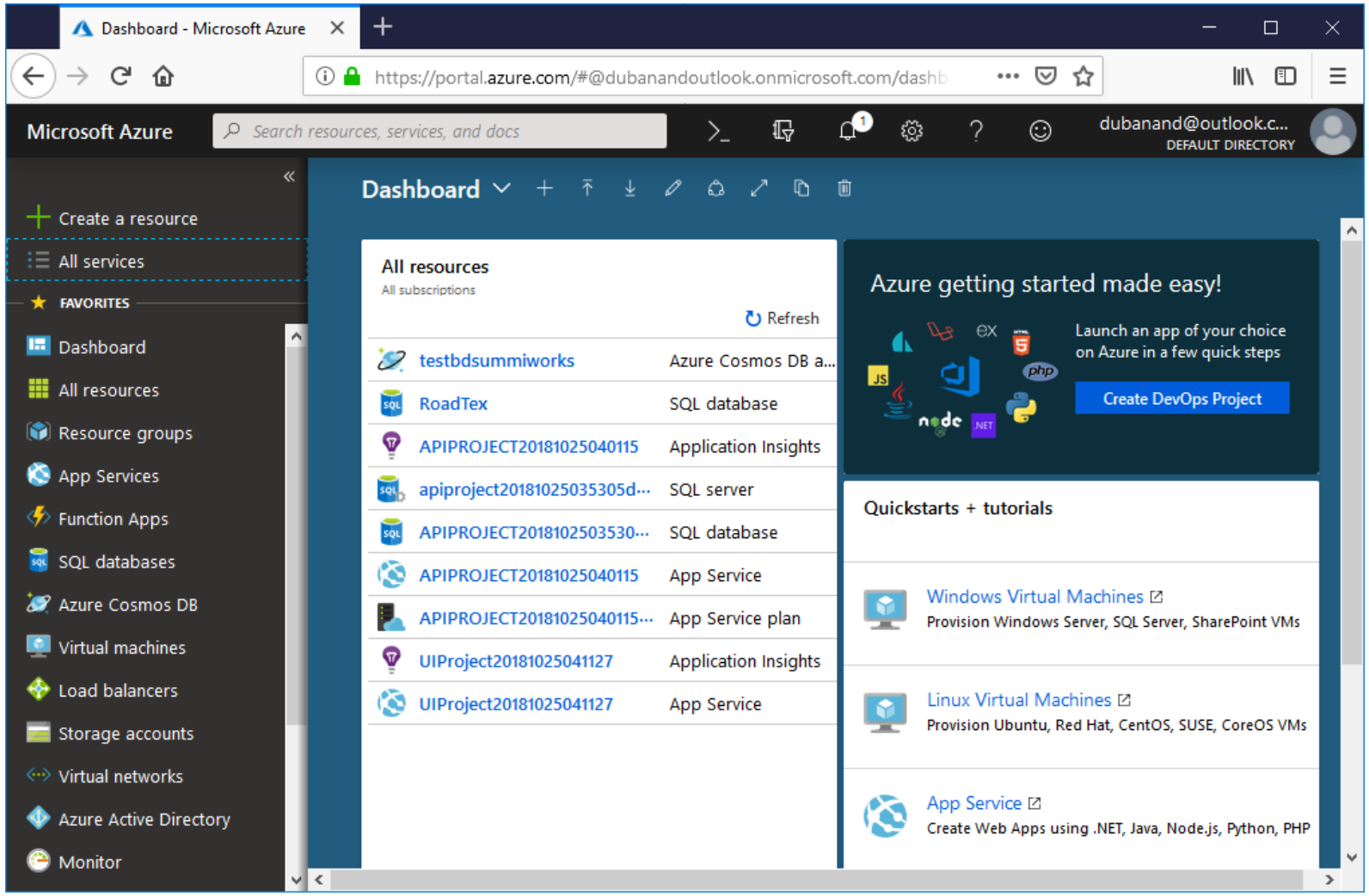
This is a platform provided by Microsoft for its Azure clients where they can see, manage and buy the services offered by Azure.

To access the management portal:

- Go to https://portal.azure.com
- Sign in with your Hotmail or live ID. If you don’t have Azure accounts, sign up for one. You will get a free trial and you can explore, learn and create your own applications using Windows Azure.

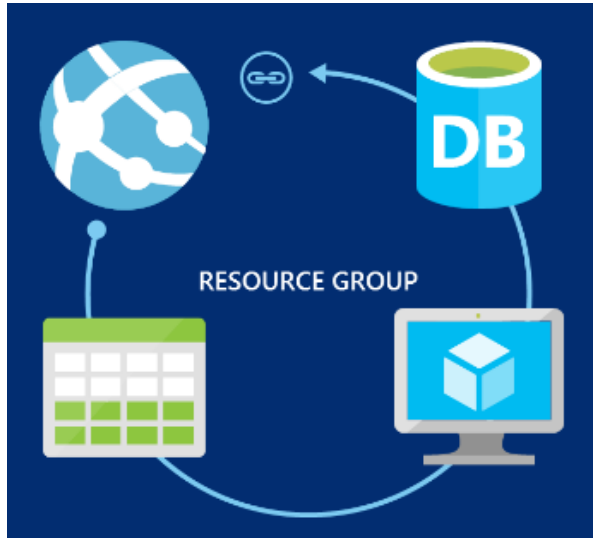


Azure Portal



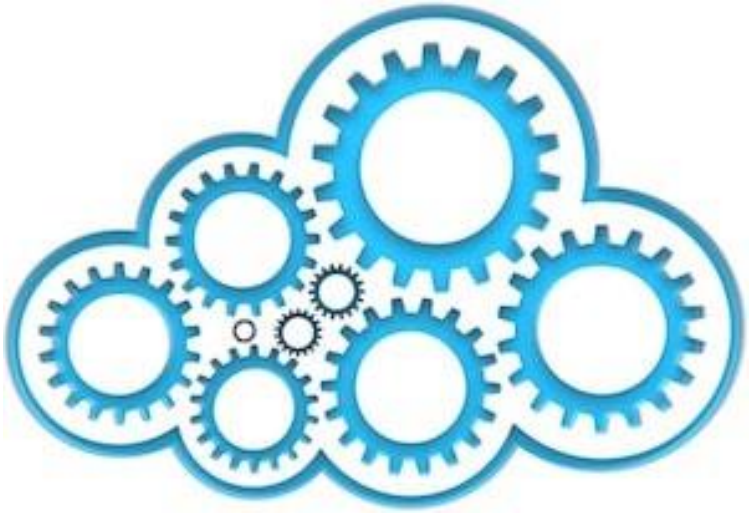
Azure Resources

- Azure resources are individual compute, networking, data, or app hosting services that have been deployed into an Azure subscription.
- Some common resources are a virtual machines, storage accounts, or SQL databases.
- Azure services often consist of several related Azure resources.
- An Azure virtual machine might include a VM, storage account, network adapter, and public IP address.
- Each resource can be created, managed, and deleted individually or as a group.



Automation

Azure Automation delivers a cloud-based automation and configuration service that provides consistent management across your Azure and non-Azure environments. It consists of process automation, update management, and configuration features. Azure Automation provides complete control during deployment, operations, and decommissioning of workloads and resources.



In addition to creating, managing, and deleting resources by using the Azure portal, you can automate these activities by using PowerShell or the Azure command-line interface (CLI).

Azure PowerShell

PowerShell

PowerShell is a framework or you can say an interface built by Azure team that lets the user to automate and manage Windows Azure services. It is a command line tool that uses the scripts or cmdlets to perform tasks such as creating and managing storage accounts or Virtual Machines that can easily be done using the preset commands.

Installing Azure PowerShell

- You can visit the link

  https://azure.microsoft.com/en-us/downloads/

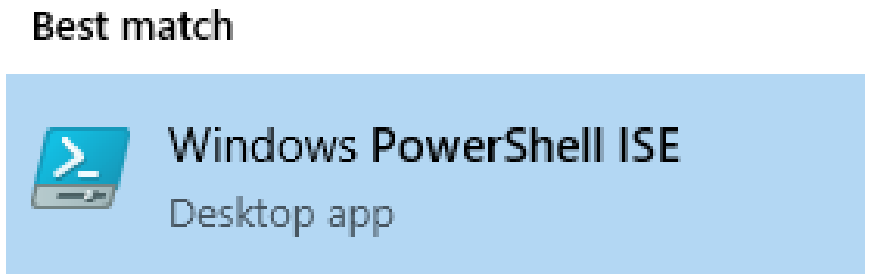
PowerShell

Microsoft Azure

Azure PowerShell

Once you have installed Azure PowerShell, you will have to connect it to your Azure subscription.

Locate Microsoft ‘Azure PowerShell’ in your programs.



Right-click on ‘Microsoft Azure PowerShell’ and select ‘Run ISE as Administrator’.

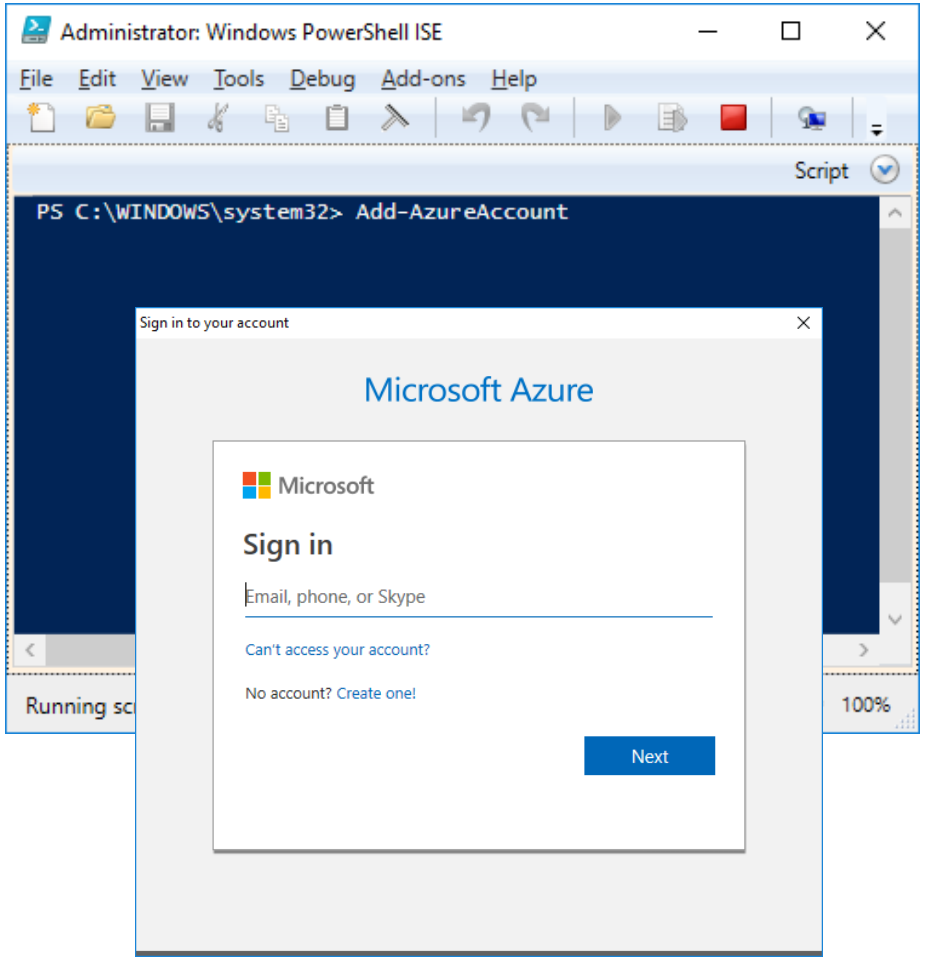
Azure PowerShell

Connect to Your Azure Account

To get started with Azure tasks, you will have to first add your Azure account to PowerShell. You just have to perform this step once on your computer and every time you run Azure PowerShell, it will connect to the account automatically.

Enter the following cmdlet in PowerShell.

Add-AzureAccount



The screen will pop up and ask for credentials of your account. Enter the credentials and sign in.

Now you are ready to perform tasks in Azure using Azure PowerShell.

Azure CLI

Command Line Interface (CLI)

The Azure CLI is a command-line tool providing a great experience for managing Azure resources. The CLI is designed to make scripting easy, query data, support long-running operations, and more.

Installing Azure CLI

- You can visit the link

  https://docs.microsoft.com/en-us/cli/azure/install-azure-cli-windows

Azure CLI

Connect to Your Azure Account

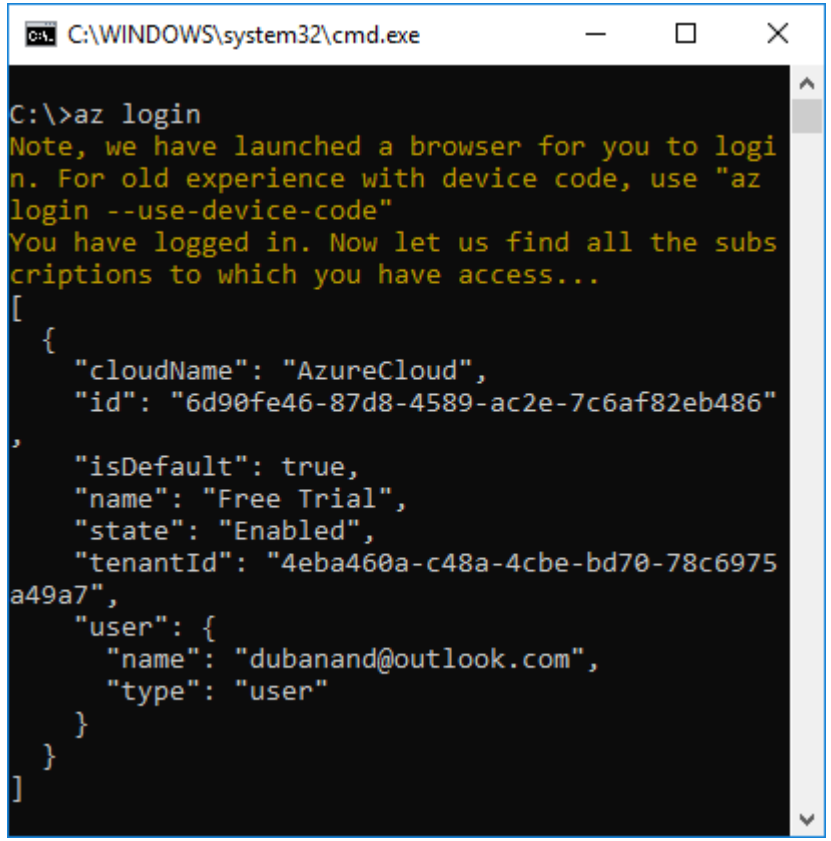
You can now run the Azure CLI with the az command from either Windows Command Prompt or PowerShell. PowerShell offers some tab completion features not available from Windows Command Prompt. To sign in, run the command:

az login

If the CLI can open your default browser, it will do so and load a sign-in page.

Otherwise, you need to open a browser page and follow the instructions on the command line to enter an authorization code after navigating to https://aka.ms/devicelogin in your browser.

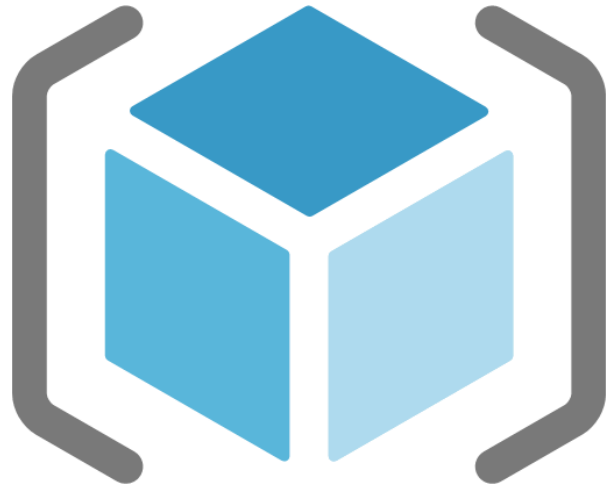
Sign in with your account credentials in the browser.



Azure Resource Manager

What is Azure Resource Manager?

The infrastructure for your application is typically made up of many components – maybe a virtual machine, storage account, and virtual network, or a web app, database, database server, and third-party services. You don't see these components as separate entities, instead you see them as related and interdependent parts of a single entity. You want to deploy, manage, and monitor them as a group. Azure Resource Manager enables you to work with the resources in your solution as a group. You can deploy, update, or delete all the resources for your solution in a single, coordinated operation.



Benefits of using Resource Manager

- You can deploy, manage, and monitor all the resources for your solution as a group, rather than handling these resources individually.
- You can repeatedly deploy your solution throughout the development lifecycle and have confidence your resources are deployed in a consistent state.
- You can manage your infrastructure through declarative templates rather than scripts.
- You can define the dependencies between resources so they're deployed in the correct order.
- You can apply access control to all services in your resource group because Role-Based Access Control (RBAC) is natively integrated into the management platform.
- You can apply tags to resources to logically organize all the resources in your subscription.
- You can clarify your organization's billing by viewing costs for a group of resources sharing the same tag.

Security of Azure resources (RBAC)

Access control

Resource Manager enables you to control who has access to specific actions for your organization. It natively integrates role-based access control (RBAC) into the management platform and applies that access control to all services in your resource group.

There are two main concepts to understand when working with role-based access control:

- Role definitions - describe a set of permissions and can be used in many assignments.
- Role assignments - associate a definition with an identity (user or group) for a particular scope (subscription, resource group, or resource). The assignment is inherited by lower scopes.

Security of Azure resources (RBAC)

Azure provides the following four platform roles:

- **Owner -** can manage everything, including access
- **Contributor -** can manage everything except access
- **Reader -** can view everything, but can't make changes
- **User Access Administrator -** can manage user access to Azure resources

Security of Azure resources (RBAC)

Azure also provides several resource-specific roles. Some common ones are:

- **Virtual Machine Contributor -** can manage virtual machines but not grant access to them, and can't manage the virtual network or storage account to which they're connected
- **Network Contributor -** can manage all network resources, but not grant access to them
- **Storage Account Contributor -** Can manage storage accounts, but not grant access to them
- **SQL Server Contributor -** Can manage SQL servers and databases, but not their security-related policies
- **Website Contributor -** Can manage websites, but not the web plans to which they're connected