Microsoft Azure Fundamentals Training (AZ-900)

Module 1

Agenda

01 Introduction to Cloud Computing

02 Why Cloud Computing?

03 What is Cloud Computing?

04 Types of Cloud Computing

05 What is Microsoft Azure?

06 Creating an Azure Account

07 Azure CLI, Powershell, portal

08 Understanding Azure Resource Manager

09 Tags and Resource locks

10 Microsoft Azure Services

11 Azure Services - Compute

12 Azure Virtual Machines

Agenda

13 Azure VM Scale Sets

14 Availability Sets

15 Custom Images

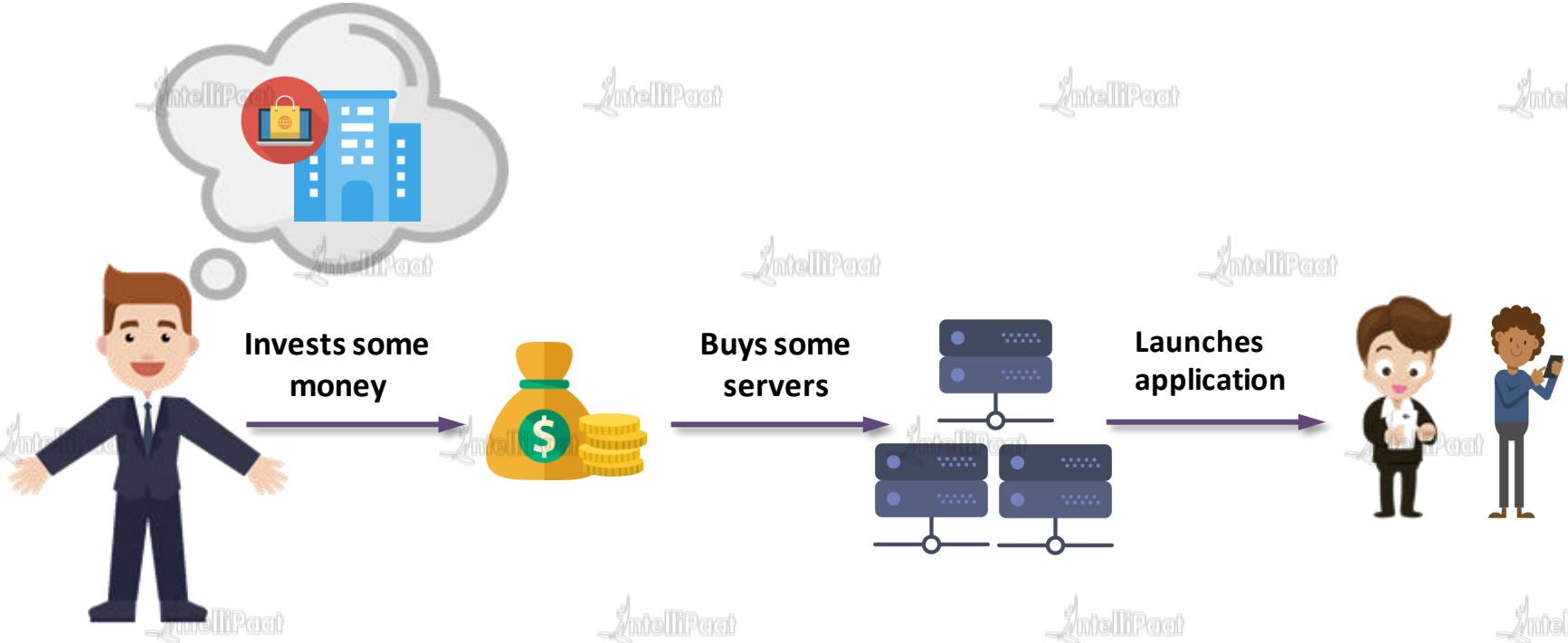
16 Azure Backup Service

17 Azure App services

Introduction to Cloud Computing

Why Cloud Computing?

Before Cloud Computing



Before Cloud Computing

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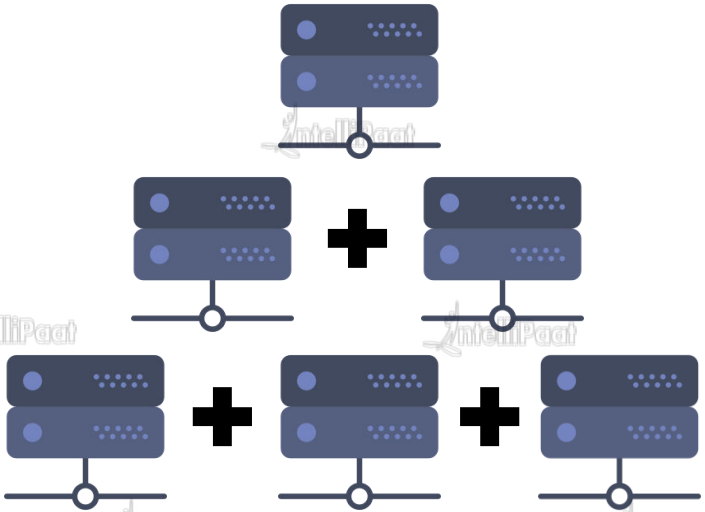

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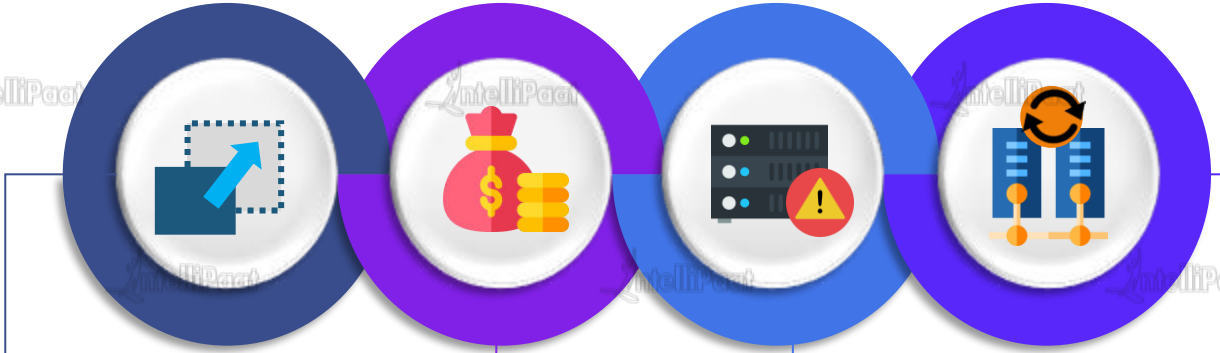


Scalability

Increase hardware as user demand increases. Increase staff to maintain the servers.

High Cost

High upfront expenses and capital expenditure. High maintenance costs.

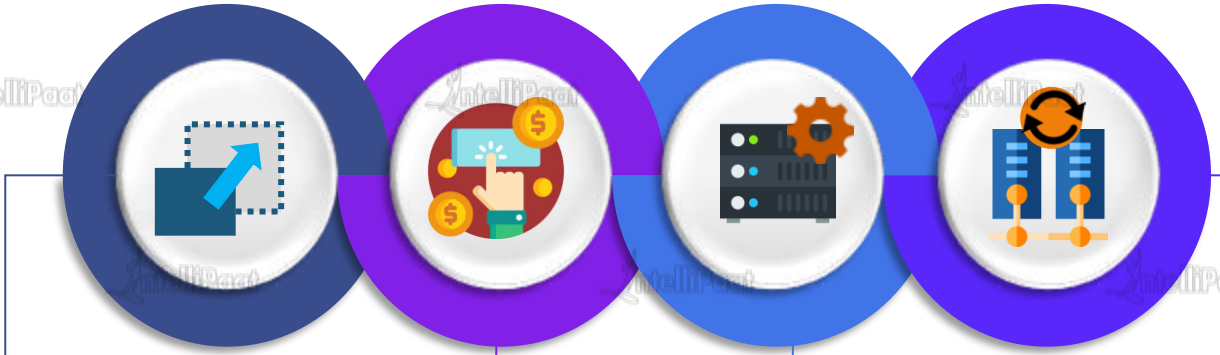
Server

Servers need to be managed and monitored continuously

Slow Data Recovery

Takes more time to recover the data. Requires high budgets and resources.

After Cloud Computing



Scalability

Can easily scale up and down to meet demand.

Cost

Users pay only for the resources they use.

Server

All the resources and services are managed by vendors.

Data Recovery

Fastest data recovery as compared to backup.

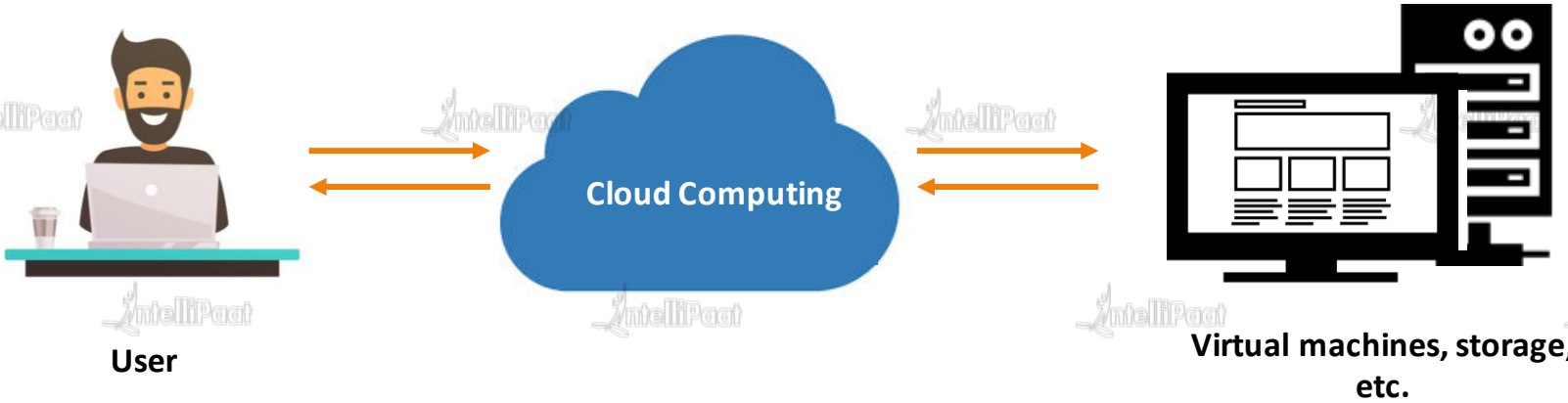
What is Cloud Computing?

What is Cloud Computing?

Cloud computing is the delivery of computing services like servers, storage, databases, networking, software, analytics, intelligence and more—over the Internet to offer faster innovation, flexible resources and economies of scale.

What is Cloud Computing?

Cloud computing is basically accessing and using various computing services and resources via the internet



Types of Cloud Computing

Types of Cloud Computing

Service Models

IaaS PaaS SaaS

Deployment Models

Public cloud Private cloud Hybrid cloud

Types of Cloud Computing - Service Models

Service Models

Infrastructure as a Service

Platform as a Service

Software as a Service

Infrastructure as a Service means delivering the whole infrastructure of a general computer as a service. In IaaS, you get complete access to server's OS, processing power and more.

Service Models

- Infrastructure as a Service
- Platform as a Service
- Software as a Service

As opposed to IaaS, in PaaS you do not get access to the whole OS. You are given the access to an already set up environment where you can run or develop applications.

Service Models

- Infrastructure as a Service
- Platform as a Service
- Software as a Service

SaaS means delivering a whole software to the customer as a service, so the customer can directly access and use the software without installing anything or updating anything.

Types of Cloud Computing - Deployment Models

Deployment Models

Public Cloud

Private Cloud

Hybrid Cloud

Public cloud refers to the standard cloud computing, which means that the cloud provider offers resources such as virtual machines, storage, applications, to the general public over the internet.

Public cloud

Deployment Models

- Public Cloud
- Private Cloud
- Hybrid Cloud

Private cloud is a pool of resources meant exclusively for a single organization.

Private cloud

Deployment Models

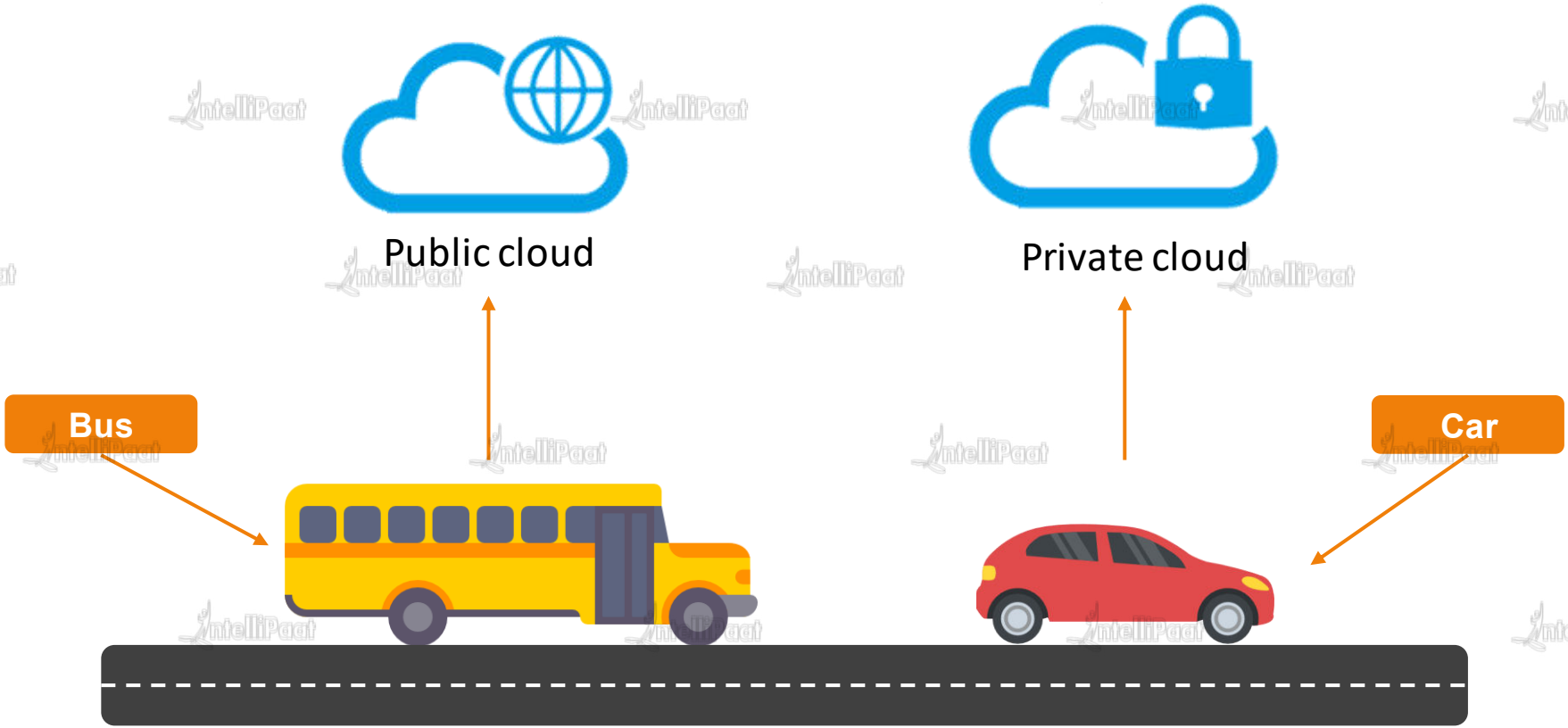
Accessible to anyone. Meant for general public.

Owned by a single person. Not meant for general public.

Bus

Car

Deployment Models



Deployment Models

Public Cloud

Private Cloud

Hybrid Cloud

Hybrid cloud refers to a cloud computing environment that uses the combination of both, private as well as public cloud.

Hybrid cloud

What is Microsoft Azure?

What Is Microsoft Azure?

Microsoft Azure is a cloud computing platform offered by Microsoft. Microsoft azure offers various web scale cloud services.

What Is Microsoft Azure?

Establishment

launched on February 1st, 2010

Widely Recognized

Used by more than 90 % of Fortune 500 companies

Cost Effective

Free to get started. Offers pay per use pricing model.

Language Support

Supports multiple languages such as C#, Node.Js, Java and more.

Availability Zones

Datacenters in 54 regions around the world

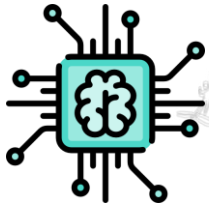
Azure Regions & Availability Zones

Azure has more global regions than any other cloud provider. In total, there are 54 regions worldwide and Azure is available in 140 countries.

Microsoft Azure Services

Microsoft Azure Services

Microsoft azure offers various web scale cloud services which are grouped together on the basis of different business usage. These groups are called domains. Some of the main domains are listed below.



Compute

Networking

Storage

Database

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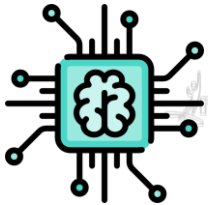

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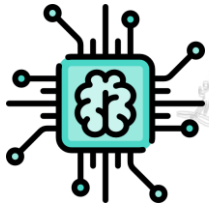

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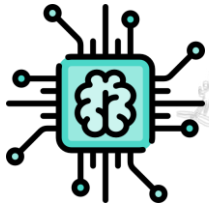

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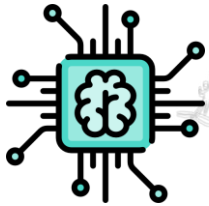


Compute

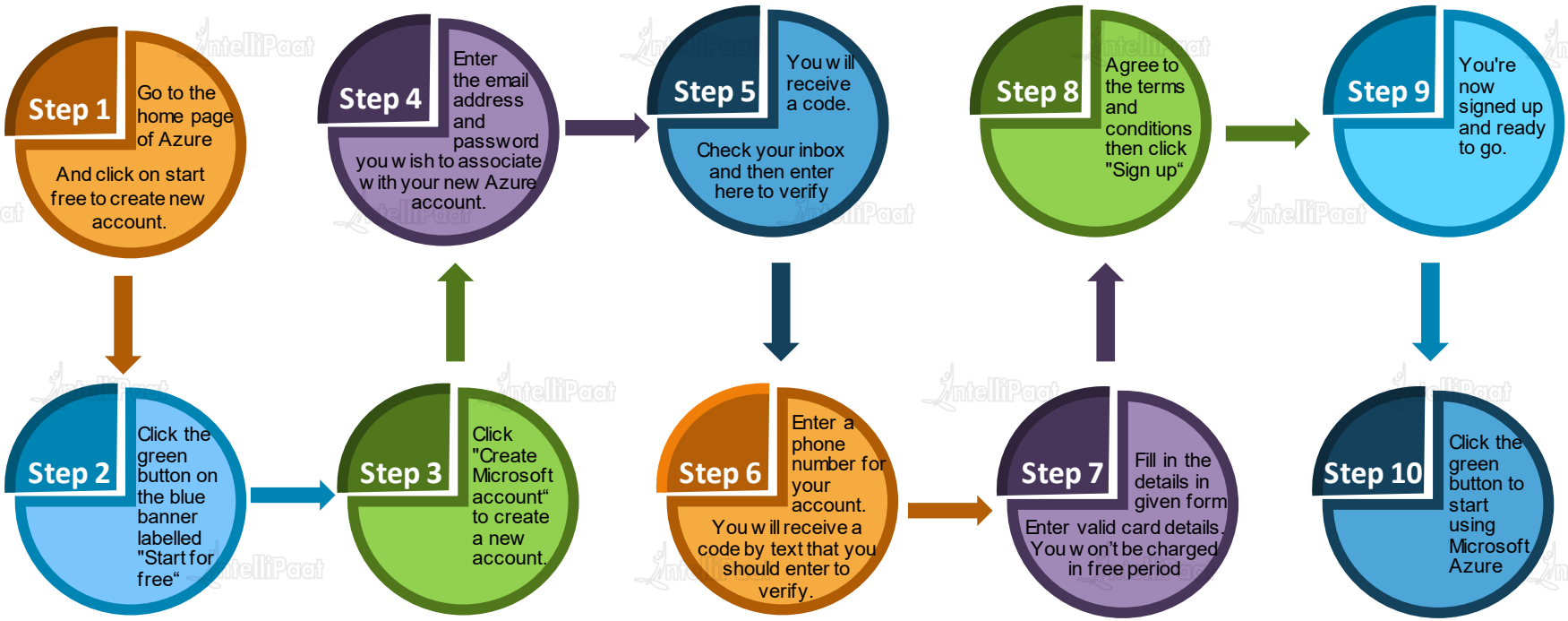
Networking

Storage

Database

Creating a Microsoft Azure Account

Creating A Microsoft Azure Account



Hands on – Creating a Microsoft Azure account

Different ways of accessing Microsoft Azure - Portal, PowerShell and CLI

Ways of accessing Microsoft Azure

Microsoft provides various ways to access Microsoft Azure platform. For those who prefer GUI, there is Azure Classic Portal. For those who prefer command line tools can use Azure PowerShell or Azure CLI.

Azure Portal

Azure CLI

Windows PowerShell

Azure Portals

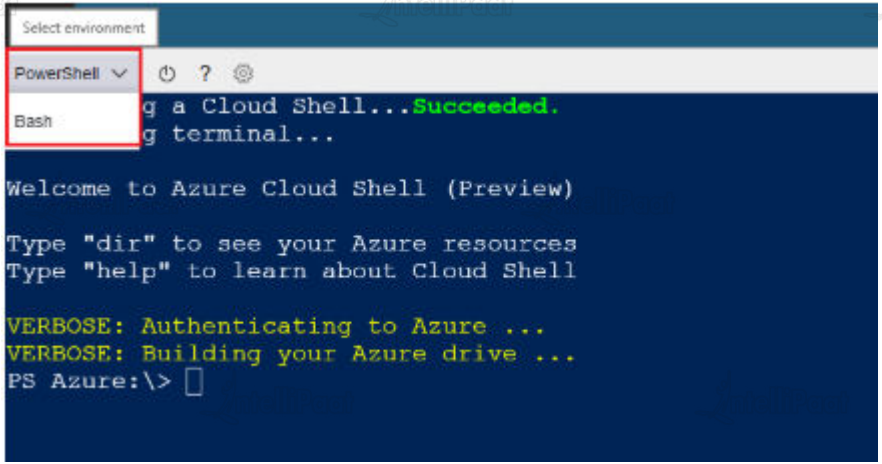
Azure Portal

Azure Portal is a web based, unified console that lets users access and manage Azure services. Using Azure Portal, users can build, monitor and manage their applications on Azure Cloud. To sign into the portal, users need to have an Azure account.

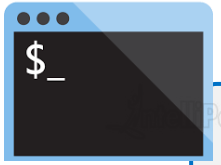
Azure PowerShell

Azure PowerShell

Azure PowerShell is a task based command line shell. It is built on .NET Framework and lets users control Azure's robust functionality, from a command line.



Azure CLI



Azure CLI

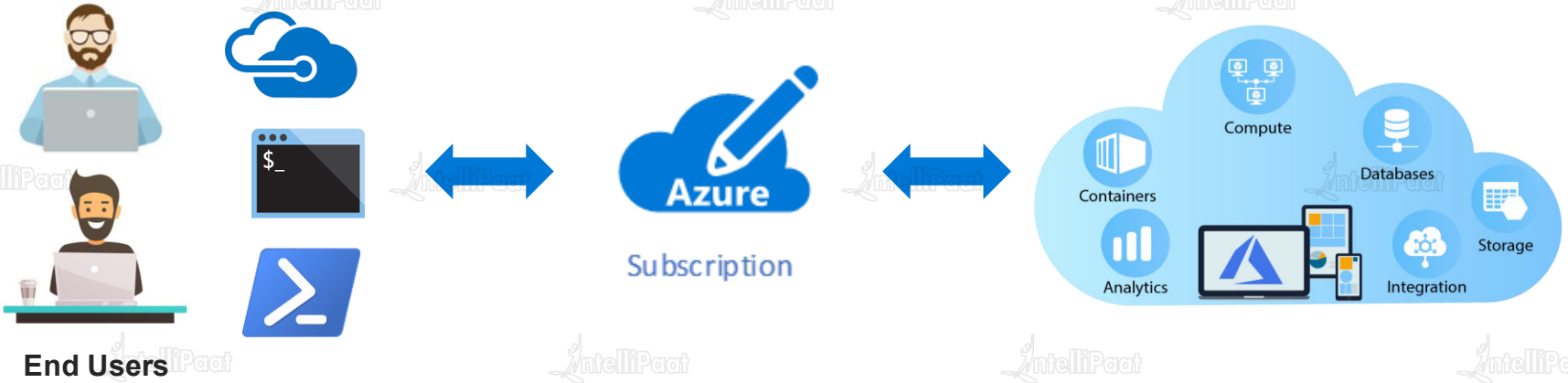
Azure CLI is a cross -platform command line tool, that is used to manage and monitor Microsoft Azure platform and services. It provides an alternative for PowerShell.

```
Bash
Requesting a Cloud Shell..Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell (Preview)

Type "help" to learn about Cloud Shell
Type "az" to use Azure CLI 2.0
```

Azure Resources and Subscriptions

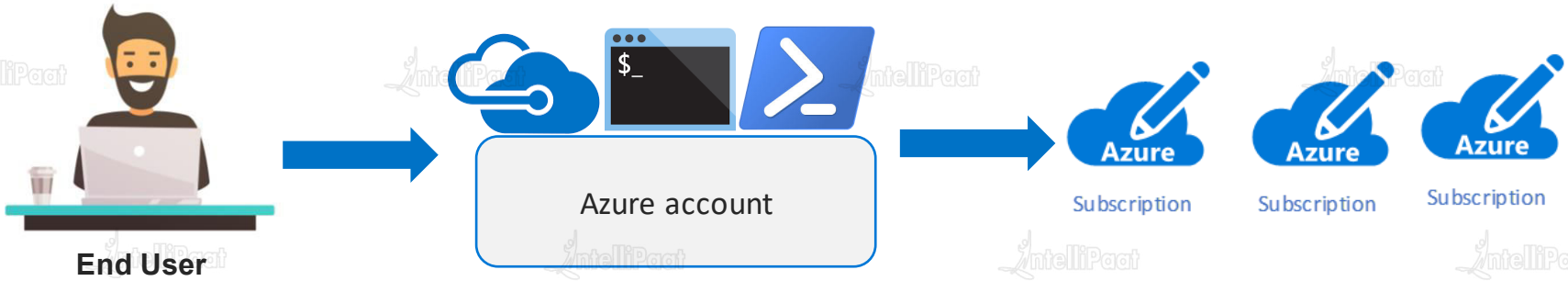
Azure Subscriptions

Azure subscription is an active agreement between the users and Microsoft. This agreement provides users the needed access to provision services and resources offered by Microsoft Azure.



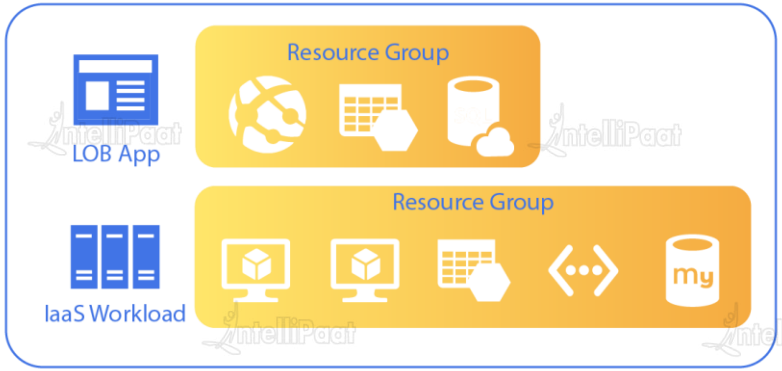
Azure Subscriptions

Azure Subscriptions are associated with Azure Accounts. Azure accounts are where the user can track the usage and billing of their Azure services. Azure accounts are also used to access the tools that are used to access Azure services.



Azure Resource Groups

Resource group in Azure is simply a collection of related Azure assets or Azure services that belong to an application or workload together.



01 .

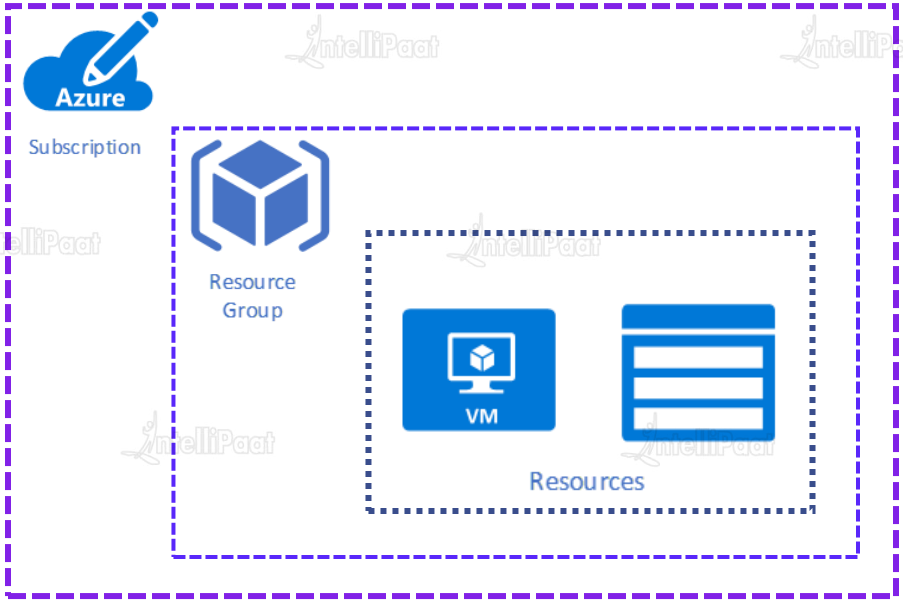
For example, the following diagram shows that the user has created a resource group for LOB application, for all the Azure services that belong to this application.

02 .

Then there is IaaS workload resource group that contains pair of virtual machines contained in a virtual network with a MySQL database for data.

Azure Subscriptions and Resources

To utilize Azure Cloud platform or to use Azure services, the very first thing that is required is Azure Subscription.



Relationship between Azure Subscription and Resources

- Every resource will be deployed within a resource group
- Every resource group has to be associated with an Azure subscription
- User can create multiple resource groups with in one Azure subscription

Understanding Azure Resource Manager

Understanding Azure Resource Manager

Azure Resource Manager (ARM)

01

Azure resource manager (ARM) is the deployment and the management service for Azure resources.

02

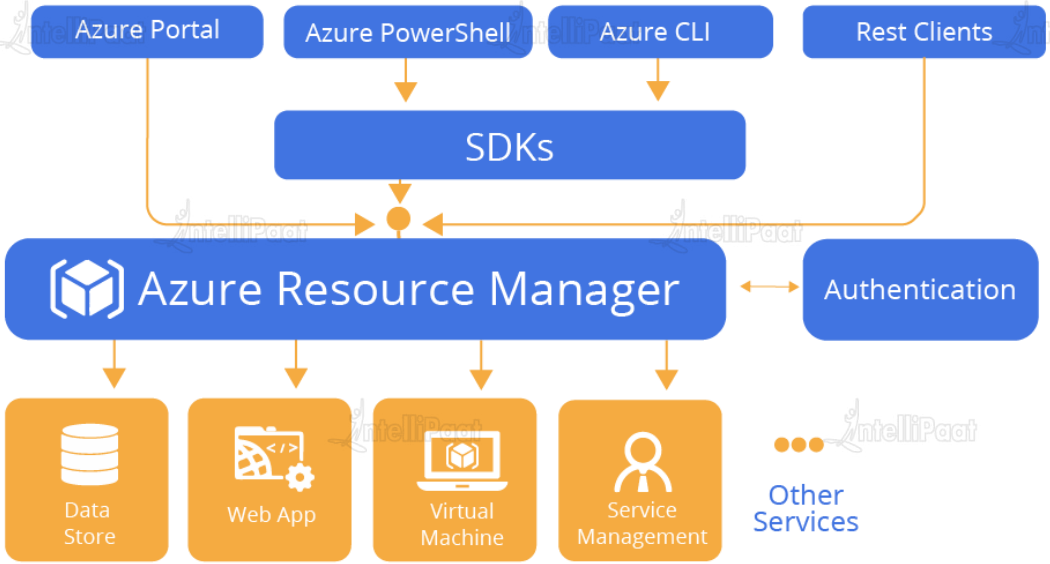
Using this service, users can create, update, and delete resources in their Azure subscription.

03

It offers features like access control, auditing and tagging to secure and organize resources after deployment.

Understanding Azure Resource Manager

When any tool is used to take actions on Azure resources, the Azure Resource Manager API handles that request. The API passes requests to the Resource Manager service, which authenticates and authorizes the requests. Resource Manager then routes the requests to the appropriate service.



Tags and Resource Locks

Azure Tags

Tags are used for the purpose of *organizing your azure resources*. Each tag consists of two components –

Name **Value**

For example the name "Dept" and value "Finance" can be applied to all the resources in Finance.
Once the tag is applied you will be able to separate out related resources in your subscription that may be under different resource groups.
This is useful while doing billing and management.

Azure Resource Locks

Resource locks is a service provided by azure to make sure that your subscription, resource group or resource is not being accidently deleted or modified from the other users in your organization.
The owner and user access administrator are granted the roles to authorize.
Lock level can be set to -

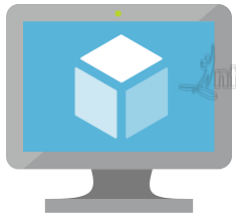
CanNotDelete

CanNotDelete means that the users can read and modify but they can not delete the resources.

ReadOnly

ReadOnly is analogous to the Reader role. The users may read but can not modify or delete the resources.

Azure Services – Compute



Virtual Machine

Function App

App Service

Azure Kubernetes Service

Microsoft Azure Services - Compute

Virtual Machine

Virtual Machines are IaaS offerings from Azure. It allows users to launch Windows and Linux virtual machines of their own choice configuration.

App Service is a Platform as a Service offering by Azure. This service provides already set up environments for developers for hosting and managing their applications

App Service

Function App

This service lets users run code or functions in cloud without having to manage underlying resource services.

This is a managed container orchestration service based on Kubernetes system. This service is used for micro service - based architecture applications.

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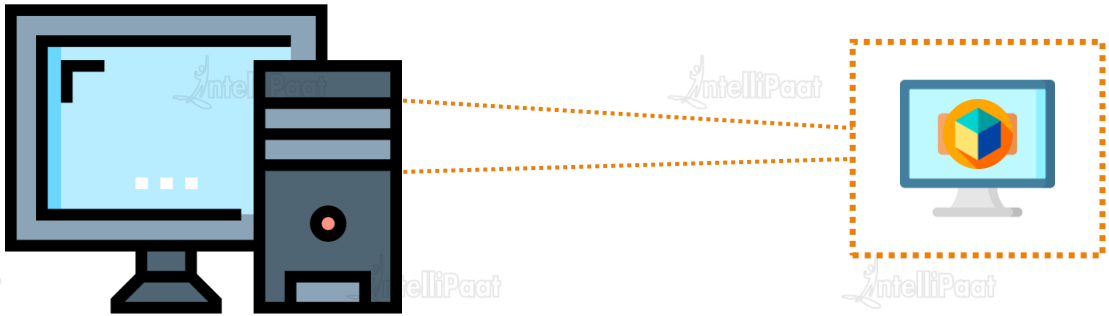
Azure Kubernetes Service

What is a Virtual Machine?

What is a Virtual Machine?

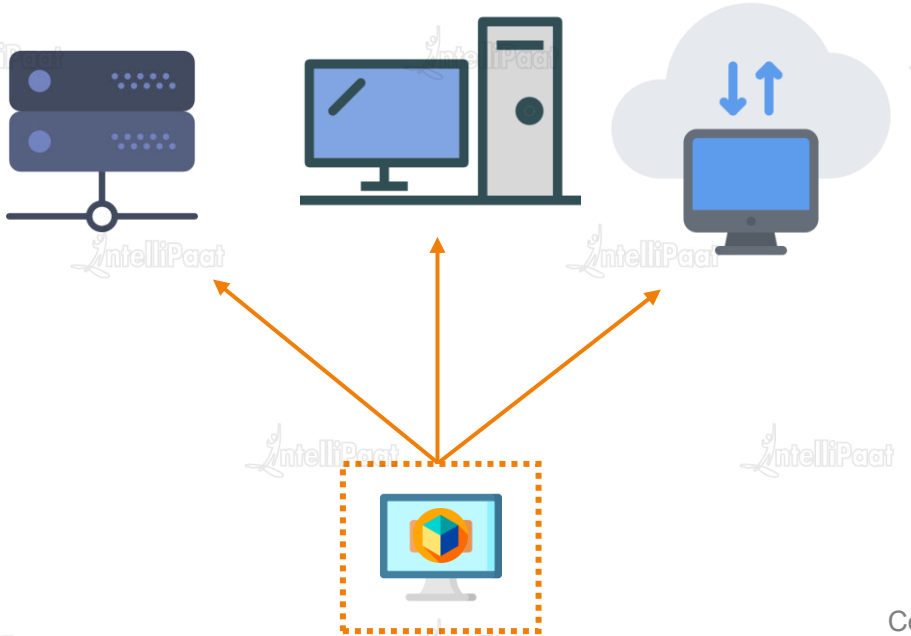
A virtual machine is a virtual emulation of a physical computer system. It is a virtual environment that includes components such as CPUs, memory, network interfaces, and more, giving end users the same experience on a virtual machine as they would have on a normal physical computer machine



Physical Computer System **Virtual Machine**

What is a Virtual Machine?

Virtual machines can be created on another physical computer system, called the host machine. Virtual machines can also be created on servers or in the cloud



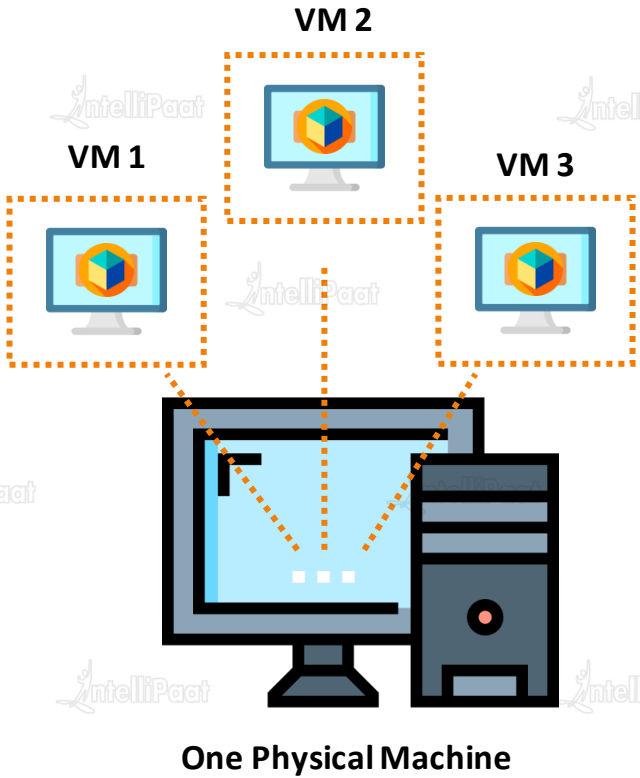
Why would you use a Virtual Machine?

Virtual Machines can be used to:

Create multiple virtual machines and run all of them on a single physical computer

Create single-purpose servers without actually having to set up a whole physical computer

Create high-availability clusters and minimize downtime



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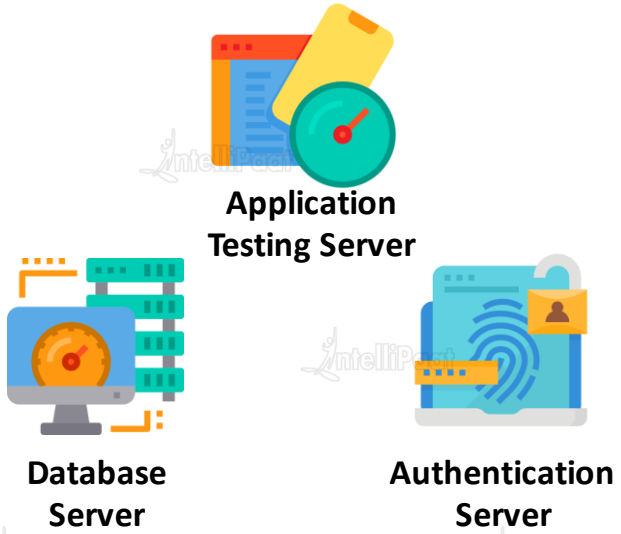

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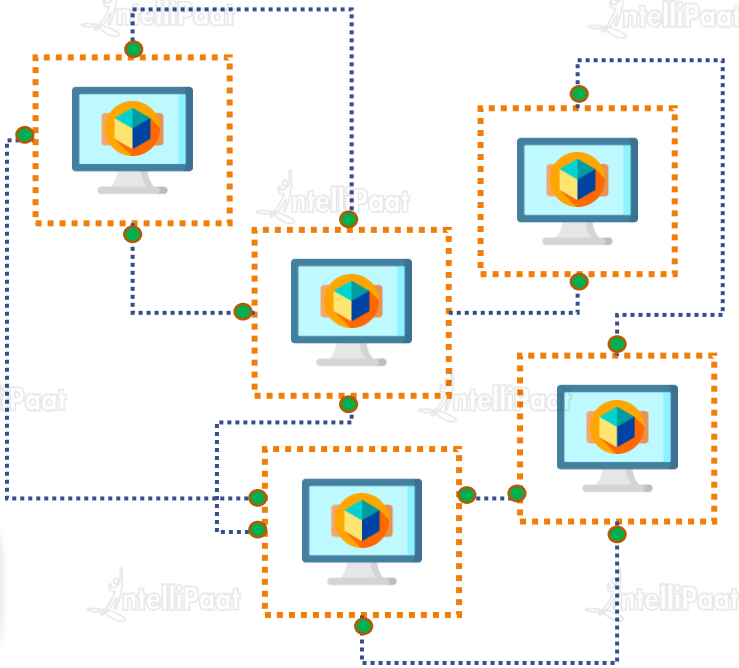
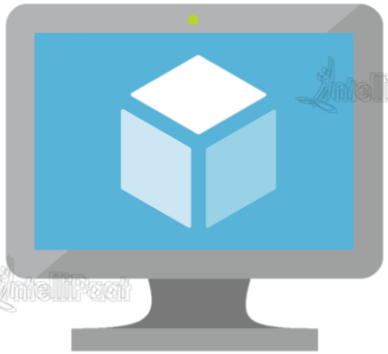


What is Azure Virtual Machine?

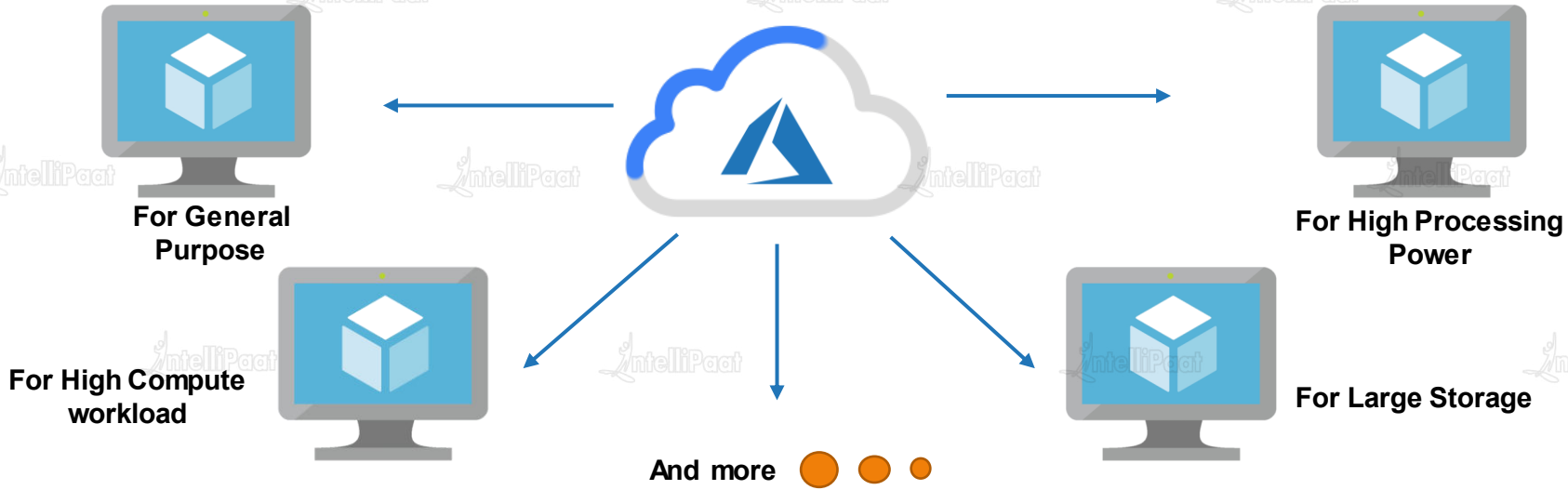
What is Azure Virtual Machine?

Azure VM is an IaaS offering from Azure. This service lets you launch virtual machines in Azure cloud, hence, giving you the flexibility of virtualization without having to buy and maintain the physical hardware



What is Azure Virtual Machine?

Azure offers different types of virtual machines, categorized on the basis of memory storage and compute types



Types of Azure Virtual Machines

Types of Azure Virtual Machines

A Series VM

This type is used for entry-level workloads like development and test machines. It is economical and provides low-cost options

D Series VM

This type of VM is used to run applications with high compute power and temporary disk performance

F Series VM

F series VMs are optimized for intensive workloads and provide higher CPU to memory ratio

G Series VM

This is a storage- or memory-optimized VM. It offers 2 times more memory and 4 times more storage than the D series

H Series VM

H series virtual machines are the next-generation high-performance computing virtual machines

L Series VM

L series VMs are storage-optimized virtual machines. They are ideal for the applications that require low latency

M Series VM

M series VMs are the largest memory-optimized VMs. They are ideal for heavy in-memory workloads like SAP HANA

N Series VM

N series virtual machines are GPU-enabled (graphic processing unit-enabled) virtual machines

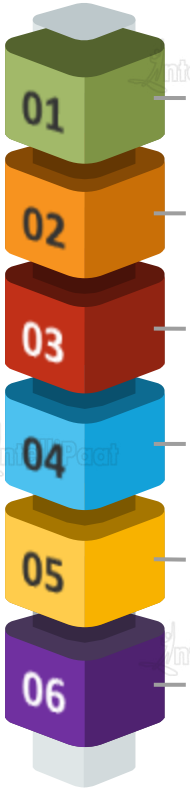
Types of Azure Virtual Machines

Types	Size	Description
Compute-optimized	Fsv2, Fs, F	Used in medium-traffic web servers, network appliance, batch process, and application servers. Below VM sizes are available in compute-optimized VMs
Memory-optimized	Esv3, Ev3, M, GS, G, DSv2, DS, Dv2, D	Used in relational database servers, medium-to-large caches, and in-memory analytics. Below VM sizes are available in memory-optimized VMs
Storage-optimized	Ls	This provides high-disk throughput and IO and is ideal for Big Data, SQL, and NoSQL databases. Ls series is only available in storage-optimized VM sizes, which offers up to 32 vCPUs
GPU - Optimized	NV, NC, NCv2, ND	GPU-optimized VMs provide high-graphic performance, and these sizes are designed for compute-intensive, graphic-intensive, and visualization workloads
High-performance Compute	H, A8-11	High-performance compute VMs use hardware designed and optimized for compute-intensive and network-intensive applications, including high-performance computing (HPC) cluster applications, modeling, and simulations

Hands-on: Creating a Basic Azure VM Using Azure Portal

Overview of the Configurations of Azure VMs

Overview of the Configurations



Basics

Minimal amount of information that is asked to create a virtual machine such as subscription, region, resource group, and so on

Networking

Networking-based configurations for your VM, e.g., if you want a public IP or not or if you want to open ports to enable different types of access to the VM

Guest Config

You can use this tab to congiure your VM to run some custom scripts. You can also use VM extensions

Disks

This tab gives you the oppurtunity to configure any data disk you might want with your virtual machine, along with letting you select the level of service those disk may serve

Management

This tab helps you manage and monitor your virtual machine. You can choose to have your VM automatically shut down, enable automated backup, and more

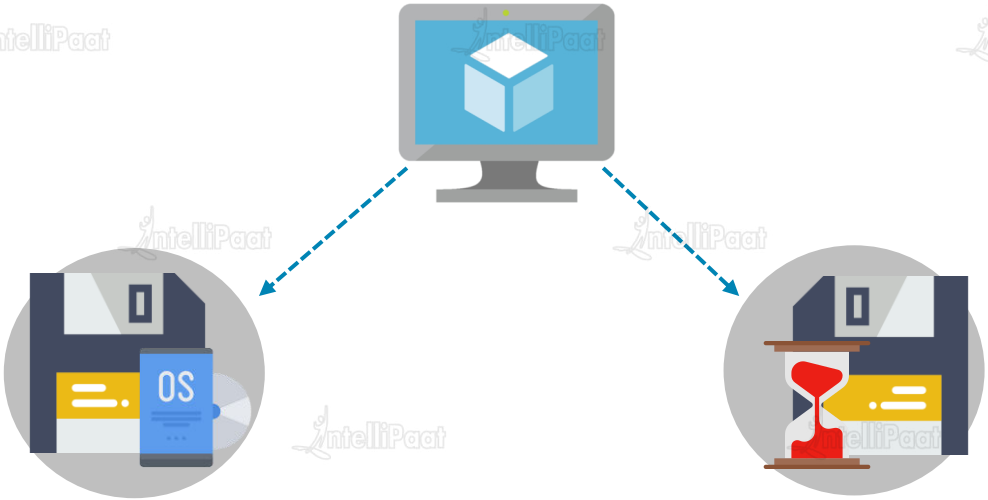
Tags

This tab allows you to set key–value pairs or labels to put on your virtual machines, making it easy to organise and filter your VMs later

Data Disks in Azure VM

Disks in Azure Virtual Machines

Virtual machines in Azure use disks as a place to store an operating system, applications, and data. All Azure virtual machines have at least two disks



Operating System Disk

Temporary Disk

Disks in Azure Virtual Machines

Operating System Disk

01

- The operating system disk is created from an image, and it is stored in an Azure storage account
- There's only one OS disk per VM
- It is labeled as: C: drive for windows & /dev/sda for Linux by default
- This disk has a maximum capacity of 2048 GB

Temporary Disk

02

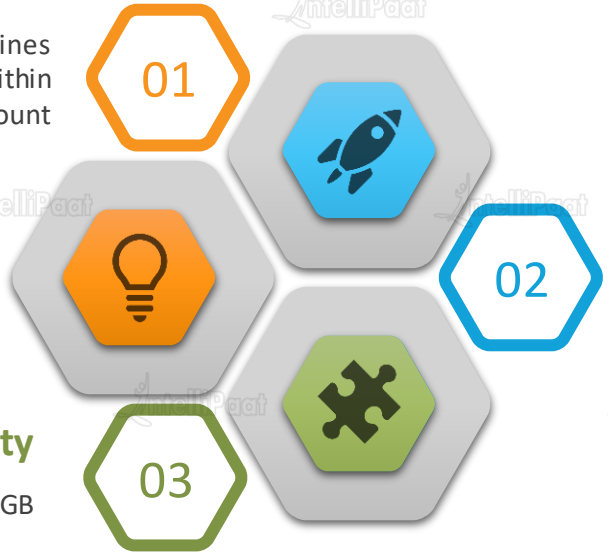
- The temporary storage provided with each VM has no extra cost associated with it for storage space and for transactions
- Data on the temporary drive will be lost, when you resize, shutdown, or restart your VM, moved to a different host server
- During a standard reboot of the VM, the data on the temporary drive should persist

What are Data Disks in Azure?

Data disks are analogous to a hard disk that is used with regular physical computers. Data disks behave like a virtual hard disk for your virtual computer deployed on Azure cloud

Virtual Hard Disks

Disks that you attach to Azure virtual machines are stored as Virtual Hard Disk (VHD) files within an Azure storage account



Number of Data Disks

The maximum number of disks is determined by the size of the VM

Data Disk Capacity

Each data disk has a maximum capacity of 4095 GB

Data Disks in Azure Virtual Machines

A few facts about disks in Azure Virtual Machines:

01

Azure disks are designed for 99.999% availability

02

A temporary disk is implemented as a local storage on the host where the VM is running

03

Operating system disks and data disks are implemented as blob storage in a storage account

04

Data disks provide persistent storage for applications and data

Managed and Unmanaged Disks

Difference Between Unmanaged and Managed Disks

Unmanaged Disks

- You must create Azure storage accounts where these unmanaged Azure VM disks will reside
- The maximum number of Azure storage accounts per region is limited to 200
- When using a standard storage with unmanaged disks, you pay only for the space you use

Managed Disk

- Azure platform controls the placement of managed VM disk files
- The limit on the number of storage accounts no longer applies. Although, there is a limit of 10,000 managed disks per region.
- With managed disks, you pay for the full capacity of a disk, regardless of the disk space that is in use

Azure VMs and Network Interfaces

VMs and Network Interfaces

A network interface enables an Azure virtual machine to communicate with the Internet, Azure cloud, and on-premise resources. When you create a virtual machine using Azure Portal, the portal creates one network interface with default settings for you

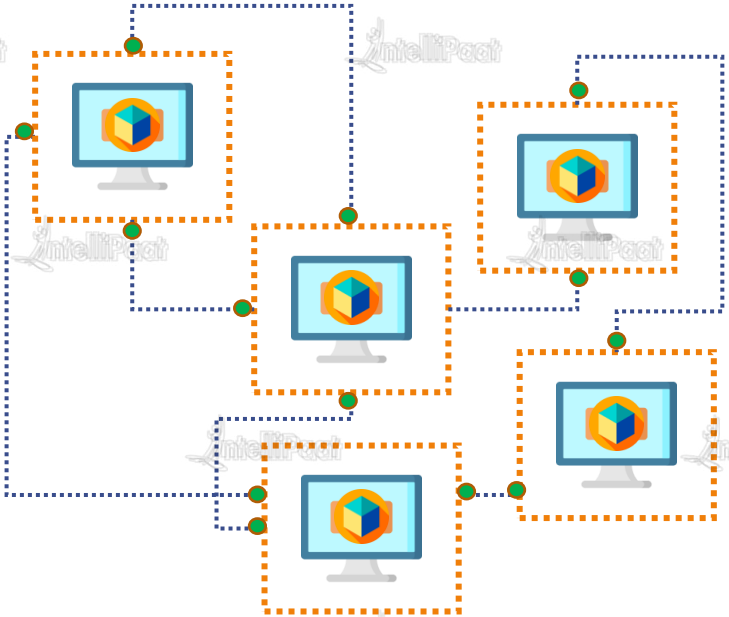
Alternatively, users can also choose to create network interfaces with custom settings

- A VM must have at least one network interface but can have more than one, depending on the size of the VM you create
- Each network interface attached to a VM must exist in the same location and subscription as the VM
- A network interface can exist either in the same or in a different resource group than the virtual machine

What are Azure VM Scale Sets?

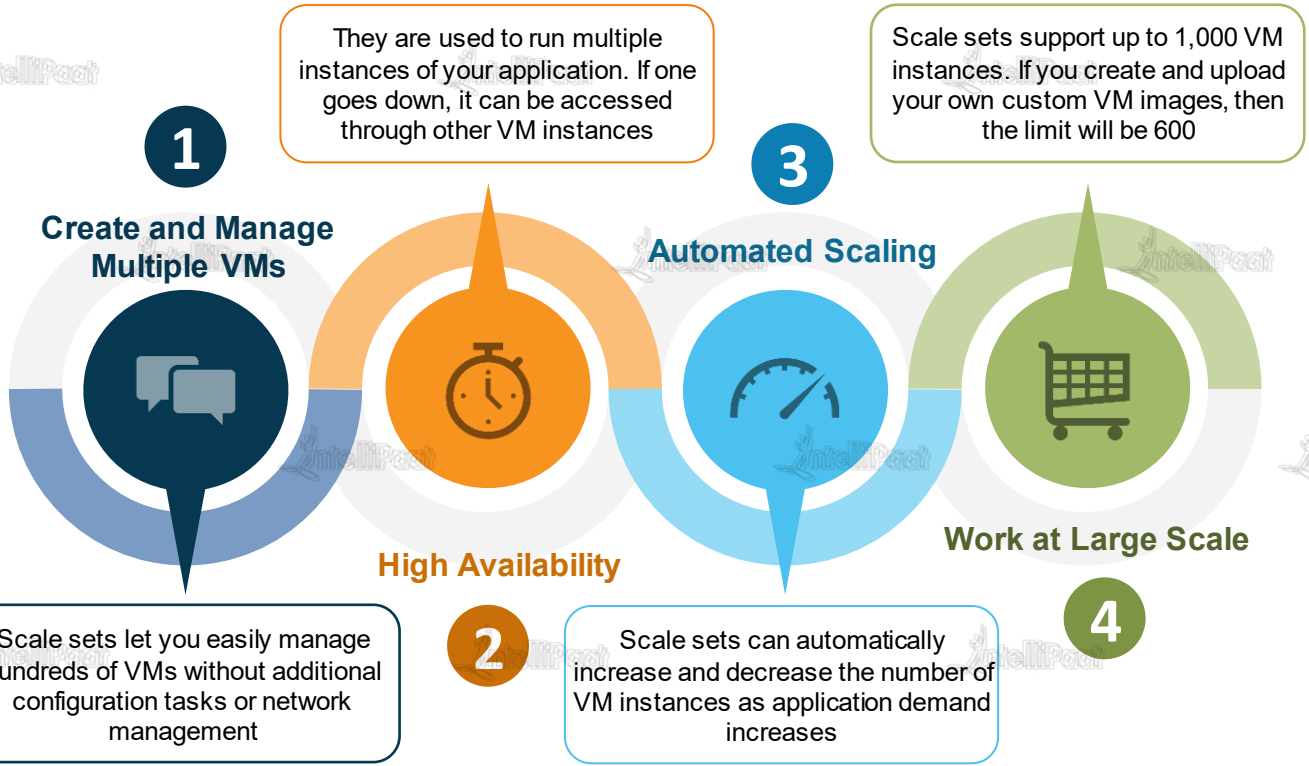
What are Azure VM Scale Sets?

Azure virtual machine scale sets let you create and manage a group of identical, load-balanced VMs. The number of VM instances can automatically increase or decrease in response with the demand or with a defined schedule



Why use Virtual Scale Sets?

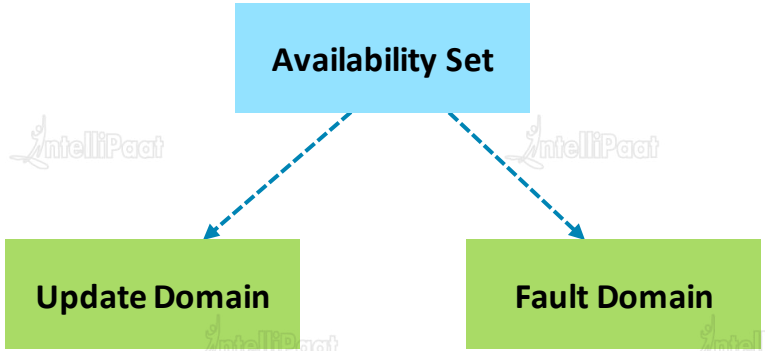
Why Use Virtual Scale Sets?



What is an Availability Sets?

Availability sets

Availability sets is a feature provided by Microsoft azure mainly *for business continuity* and *high availability*.
If there are two or more servers in an availability set, if one or more of the servers stop working for some reason, rest of the servers in the availability set will provide the service

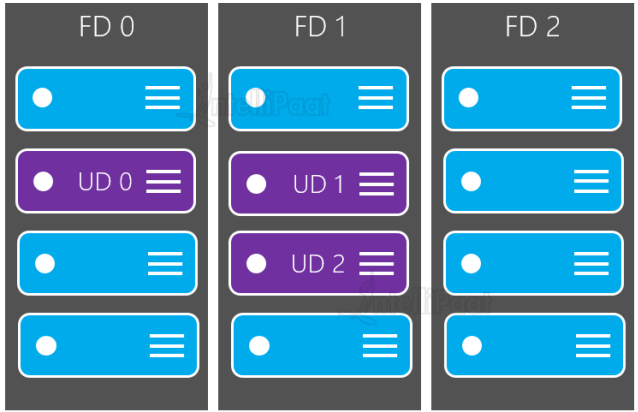


Fault and Update domains – Availability set

The availability sets separate the resources into fault domains and update domains.

Fault Domain is a collection of a server, network and storage resources.

Update Domain ensures that Azure performs it's software updates from time to time. The resources are isolated.



Demo availability set

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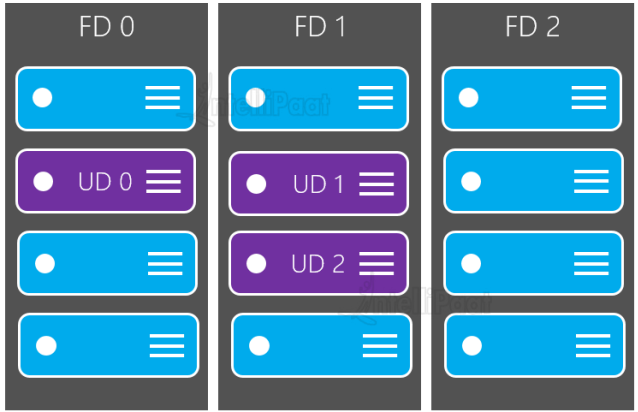

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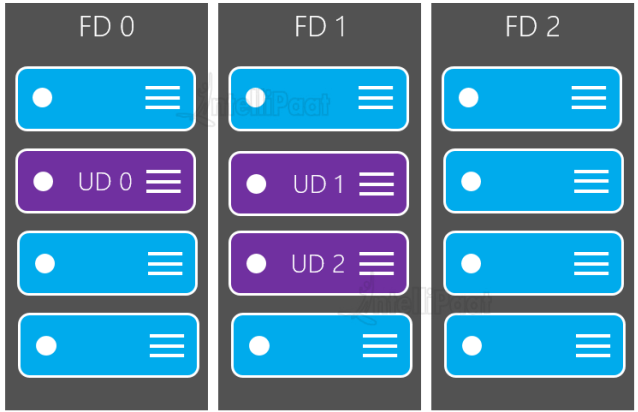


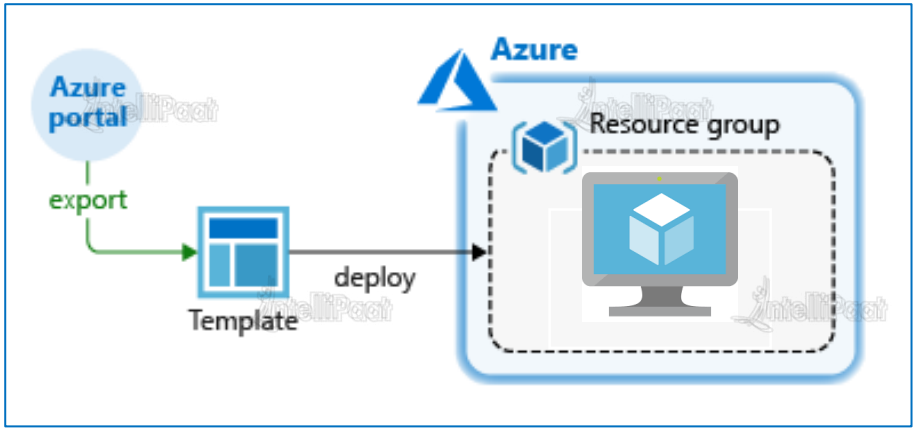
Demo availability set

What is an ARM Template?

What is an ARM Template?

Azure Resource Manager template is a JSON file that defines a set of resources needed for an application. It also defines dependencies and parameters which enable a user to configure settings for resources while requesting the them

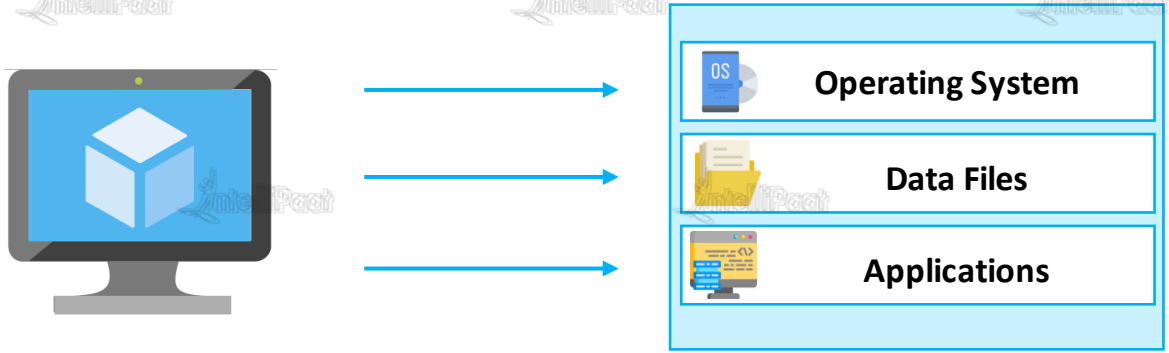
You can save a deployment as an ARM template and then use this template to automate that deployment, using Azure Portal



What are Custom Images?

What are Custom Images?

An image is a copy of a VM or a template for creating a VM, which might contain an OS, data files, and applications. Using these custom images, you can create a VM



Backing up from Azure

What is Azure Backup Service?

Azure offers a built-in backup service that lets users backup their data to the Microsoft Azure Cloud. This service can also be used to take on-point backup of Azure VMs

VM backups in Azure are stored in Recovery Service vaults. You can access these Recovery Service vaults through Azure Portal

- Azure gives full flexibility to configure and modify a VM backup
- You can choose when to create a backup according to the time that works best for you
- You can enable a backup for as long as you want
- Recovery Service vaults are connected to your storage account and scale automatically to accommodate your backup
- Azure backup is a pay-as-you-go service, i.e., you only pay for the storage amount that you use

Restoring a Backup

Create a New VM

Quickly creates and gets a basic VM up and running from a restore point. You can specify a name for the VM and a storage account for the restored VM

Replace the Existing

You can restore a disk and use it to replace the disk on the existing VM. The current VM must exist. If it's being deleted, this option can't be used

Restore the Disk

Restores a VM disk, which can then be used to create a new VM. Alternatively, you can attach the disk to an existing VM

Azure Site Recovery

What is Azure Site Recovery?

Azure Site Recovery is a disaster recovery solution offered by Azure. This service makes sure that your data or workloads are available even during the outages

01

Site Recovery replicates workloads running on physical and virtual machines (VMs) from a primary site to a secondary location

02

When an outage occurs at your primary site, you failover to the secondary location and access apps from there. Once the primary location starts running again, you can failback to it

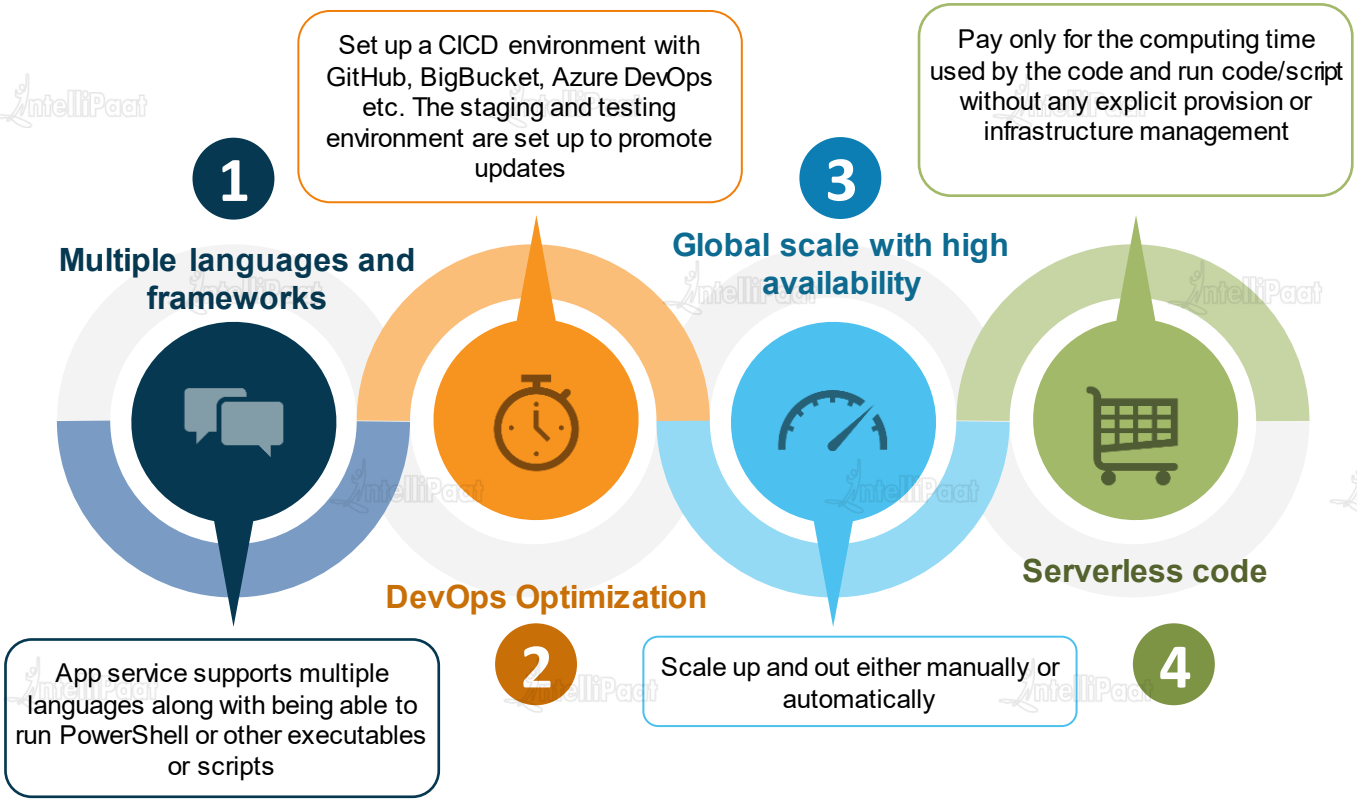
Azure App Services

What are Azure App Services?

HTTP-based service provided by Microsoft azure to host web applications, Mobile backends and REST APIs.

It supports a variety of languages such as - .NET, .NET core, Java, Ruby, Node.js, PHP and Python.

Why Use Azure App Services?

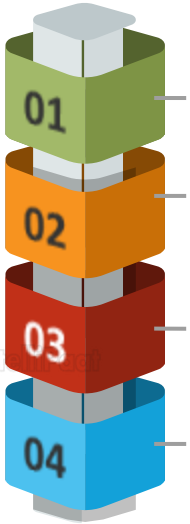


App service Plan

Each app service runs on an app service plan in the background. It defines a set of compute resources that are required to run the app service.
You pay for your application deployment depending on this app service plan.

There can be multiple app services that are using the same app service plan.
This service is analogous to a server farm in relation to conventional web hosting.

Overview of App service plan configurations



Region

This defines the region of the deploymrnt of your application. This may be East US, Central US and so on.

Size of VM Instances

Small, Medium or Large

Number of VM Instances

This defines the number of virtual machine instances of the application that are to be created.

Pricing tier

This defines what app service features will be accessible by you and how much you'll have to pay for the same. This may be free, shared, basic premium, premiumV2 or isolated.

Staging environment in App services

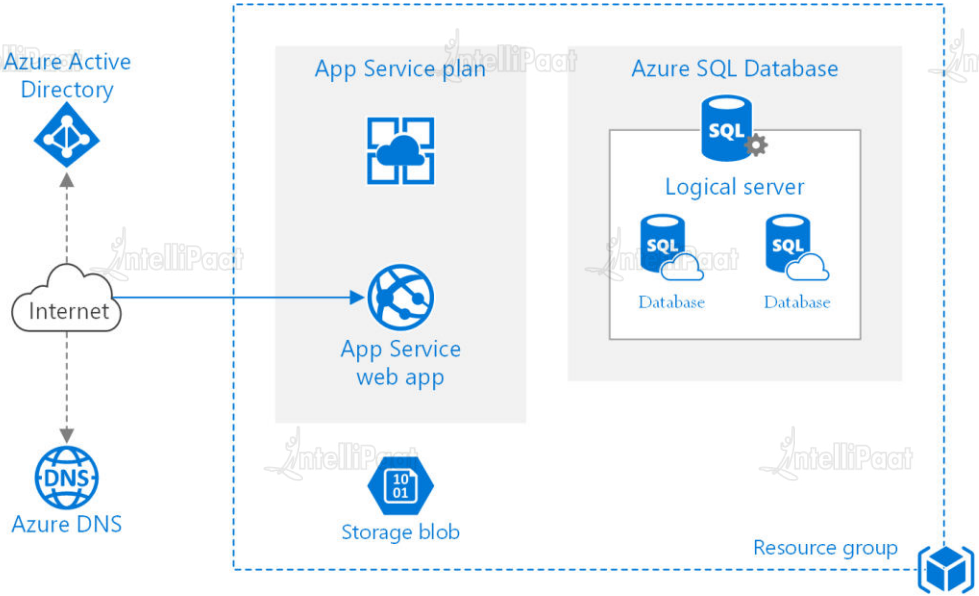
Azure offers the service of being able to set of a staging environment in app services by creating a separate **deployment slot** instead of the default production slot.

Swap function (of deployment slots) is used to replace the previously staged app with the previous production app. Some of the benefits of the staging environment are:

- The changes in the staging deployment slot can be validated before swapping it with production slot.
- Using the swap and auto-swap function, the downtime may be eliminated while deploying the application. The redirection of traffic is not hindered and no requests are dropped.
- You are able to get your 'Last known good site' back by swapping again.

Azure app services: Use Case

The given architecture of a use case is deploying an App service web application with an App service plan associated with it. It is connected to resources such as Storage blob, Azure SQL database, AAD and Azure DNS.



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