

# Cloud Computing

(COCSC15)



Submitted By: -  
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COE – 1

# **INDEX**

<b>S.No</b>	<b>Topic</b>	<b>Pg.No.</b>
1	Microsoft Azure	3
2	Amazon Web Services	9
3	Google Workspace/ G-Suite	14
4	VMware	19
5	Meghraj by NIC	23

# **Case Study 1**

## **Microsoft Azure**

### **Introduction**

Microsoft Azure is a Microsoft cloud service provider that provides cloud computing services like computation, storage, security and many other domains. Microsoft is one of the global leaders when it comes to Cloud solutions and global cloud infrastructure. Microsoft Azure provides services in 60+ global regions and serves in 140 countries. It provides services in the form of Infrastructure as a service, Platform as a Service and Software as a service. It even provides serverless computing which is a service in which we are just required put our code while all our backend activities will be managed via Microsoft Azure.

### **History and Motivation**

Microsoft first unveiled its plans to introduce a cloud computing service called Windows Azure in 2008. Preview versions of the service became available and developed, leading to its commercial launch in early 2010. Although early iterations of Azure cloud services fell behind more established offerings -- such as AWS -- the portfolio continued to evolve and support a larger base of programming languages, frameworks and operating systems. By early 2014, Microsoft recognized that the implications of cloud computing stretched far beyond Windows, and the service was rebranded as Microsoft Azure.

### **Deployment models**

Microsoft Azure offers two deployment models for cloud resources: the "classic" deployment model and the Azure Resource Manager. In the classic model, each Azure resource (virtual machine, SQL database, etc.) was managed individually. The Azure Resource Manager, introduced in 2014, enables users to create groups of related services so that closely coupled resources can be deployed, managed, and monitored together. The Azure platform aims to help businesses manage challenges and meet their organizational goals. It offers tools that support all industries -- including e-commerce, finance and a variety of Fortune 500 companies -- and is compatible with open source technologies. This provides users with

the flexibility to use their preferred tools and technologies. In addition, Azure offers 4 different forms of cloud computing: infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS) and serverless.

## Microsoft azure works as:

### **1.) Infrastructure as a Service (IaaS):**

Infrastructure as a Service, sometimes abbreviated as IaaS, contains the basic building blocks for cloud IT and typically provide access to networking features, computers (virtual or on dedicated hardware), and data storage space.

### **2.) Platform as a Service (PaaS):**

Platforms as a service remove the need for organizations to manage the underlying infrastructure (usually hardware and operating systems) and allow you to focus on the deployment and management of your applications.

### **3.) Software as a Service (SaaS):**

Platforms as a service remove the need for organizations to manage the underlying infrastructure (usually hardware and operating systems) and allow you to focus on the deployment and management of your applications.

## **Azure competition**

Microsoft Azure is one of several major public cloud service providers operating on a large global scale. Other major providers include Google Cloud Platform (GCP), Amazon Web Services (AWS) and IBM.

Currently, there is a lack of standardization among cloud services and capabilities -- meaning no two cloud providers offer the same service in the exact same way, using the same APIs or integrations. This makes it difficult for a business to use more than one public cloud provider when pursuing a multi-cloud strategy. Third-party cloud management tools can reduce some of these challenges.

## Virtualisation

Azure Virtual Machines (VM) is one of several types of on-demand, scalable computing resources that Azure offers. Typically, you choose a VM when you need more control over the computing environment than the other choices offer. An Azure VM gives you the flexibility of virtualization without having to buy and maintain the physical hardware that runs it. However, you still need to maintain the VM by performing tasks, such as configuring, patching, and installing the software that runs on it.

Azure virtual machines can be used in various ways. Some examples are:

**Development and test** – Azure VMs offer a quick and easy way to create a computer with specific configurations required to code and test an application.

**Applications in the cloud** – Because demand for your application can fluctuate, it might make economic sense to run it on a VM in Azure. You pay for extra VMs when you need them and shut them down when you don't.

**Extended datacentre** – Virtual machines in an Azure virtual network can easily be connected to your organization's network.

The number of VMs that your application uses can scale up and out to whatever is required to meet your needs.

This table shows some of the ways you can get a list of available locations.

Method	Description
Azure portal	Select a location from the list when you create a VM.
Azure PowerShell	Use the <code>Get-AzLocation</code> command.
REST API	Use the <code>List locations</code> operation.
Azure CLI	Use the <code>az account list-locations</code> operation.

## **Benefits of Microsoft Azure**

- On-Demand Scalability
- Cost Effective
- Hybrid Environments
- Data Backup and Recovery
- Scheduling and Automation
- Storage and Security
- Integration Capabilities
- Big data Applications

## **Use Cases of Microsoft Azure**

Microsoft has many popular customers out there such as:

### **University Of Toronto**

This is the largest Canadian university and leads the global front when it comes to research at an institutional fare. It made use of Microsoft Azure to avoid heavy hardware renewal costs. It migrated some of its activities to Microsoft Azure Cloud. With it, the university managed to transform IT processes, saving a lot of time

### **AkzoNobel**

AkzoNobel is a popular Dutch Company that leads way in paint and coating business. It serves in more than 100 countries and always needs better connectivity across the globe. It harnessed the power of Microsoft Azure IoT services to improve its performance and connectivity at a global level.

### **IHG (Intercontinental Hotel Group)**

This is one of the largest and leading hotel groups in the world. It owns around 5200 properties across the globe and serves more than a hundred countries. The fact that you own 5200 properties tells you the group holds its values of service very truly and also must have experimented a lot to stay up to date with market needs as well. This fact is also supported by the fact that this group invests a lot of money in innovations to meet the experience quality the customers deserve.

The company has many of its tools that require Agile practices. It already was based on Azure Cloud platform. This is when they decided to use

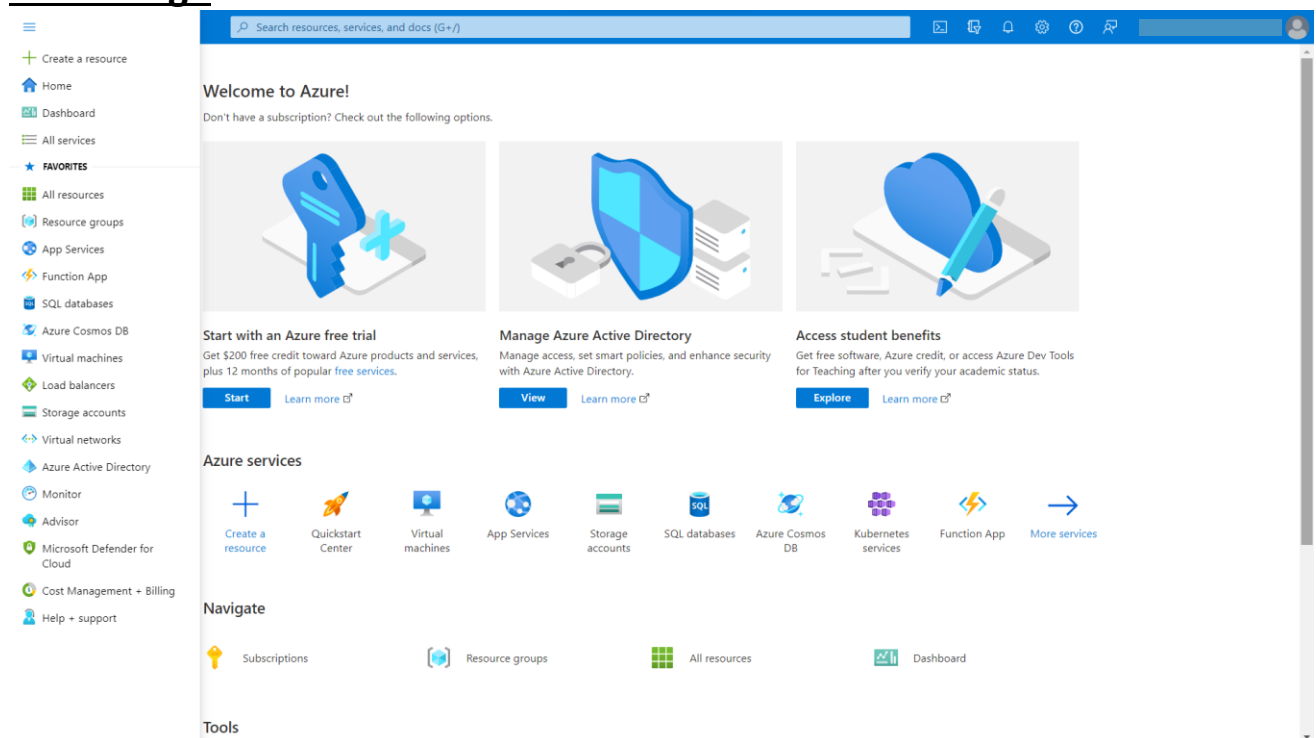
DevOps Services on Microsoft Azure. This not only helped them bring their software and data handling process on track, but also helped them fortify their security and processing principles. The fact that Microsoft Azure Supports Hybrid cloud meant big group like IHG did not have to move to Azure cloud altogether.

Ever since it has moved to Azure StorSimple, which is a hybrid storage service for enterprises. The group has achieved great results when it comes to storing data. It has helped them save more 70 percent in terms of cost. This is something that was initiated four years ago. It needed very little support in setting up and does require too much intervention when it comes to administrative attention.

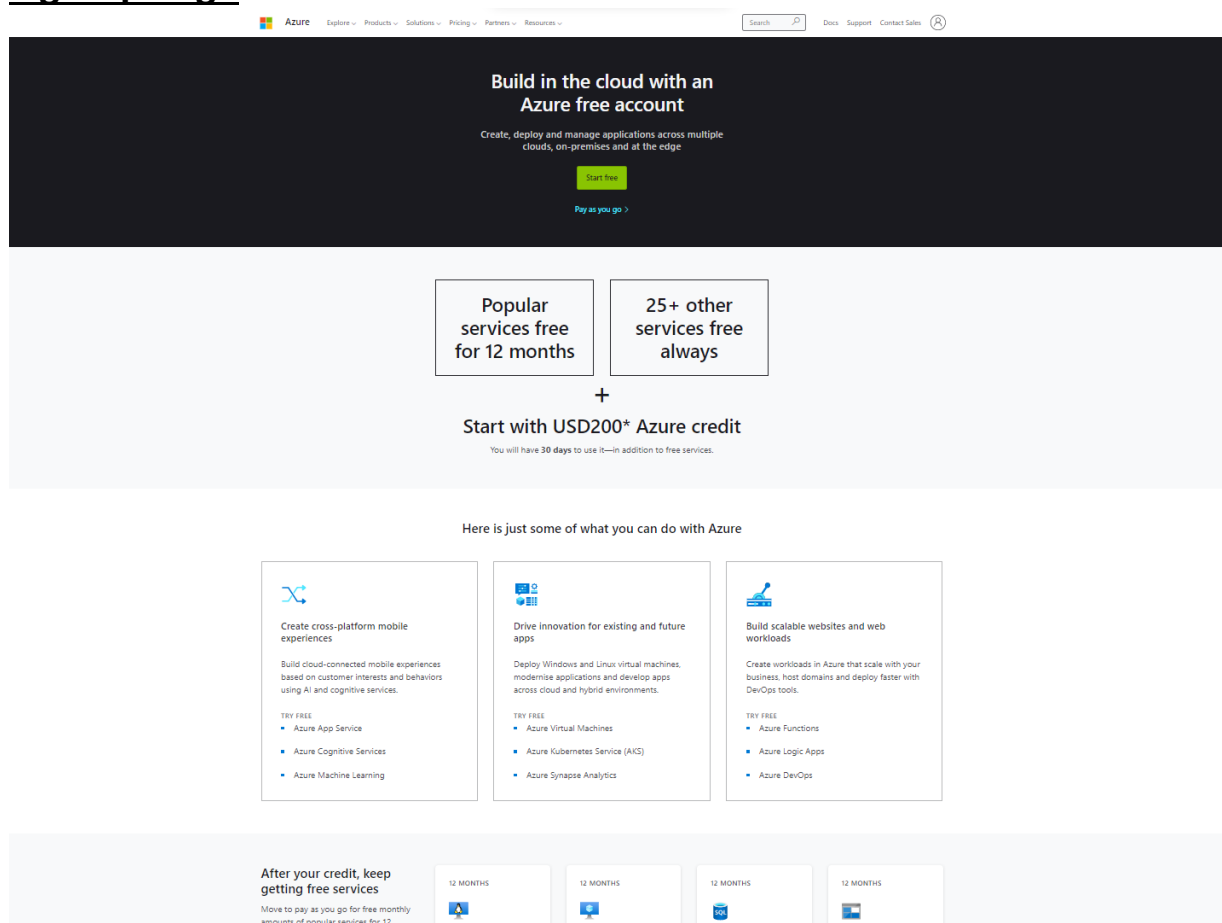
Before they moved to the above-mentioned service, IHG group had to deal with multiple data and file services to gather and store data. Azure StorSimple ensured this data was consolidated and easy to manage overall. Data Backup issue was also resolved as Azure ensured that easy way to get a snapshot of data. That means data could be backed up easily and quickly

# Hands on experience

## Home Page



## Sign Up Page





# **Case Study 2**

## **Amazon Web Services**

### **Introduction**

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centres globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

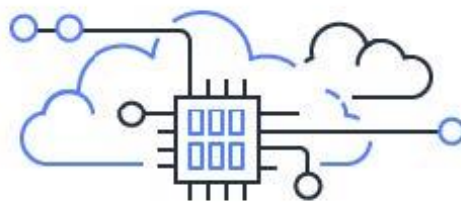
### **Foundation and Motivation**

The genesis of AWS was in the early 2000s, when Amazon switched to service-oriented architecture to serve their Merchant.com, Amazon's third-party retailers. This was to be a means of scaling their engineering operations led by the then CTO, Allan Vermeulen.

In November 2004, the first AWS infrastructure service launched for public usage: Simple Queue Service (SQS).

### **Deployment model**

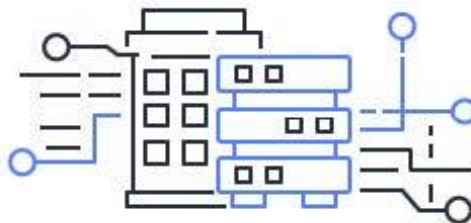
The cloud deployment model refers to applications that are deployed and run entirely in the cloud. There are two ways in the cloud. First, they are either created in the cloud. Second, they are migrated to the cloud from their current infrastructure. The low-level infrastructure fragments can accommodate the development of cloud-based applications.



AWS uses hybrid cloud computing model. The hybrid deployment model refers to devising an infrastructure and applications connectivity between cloud-based resources and legacy resources that are located on-premise. The most frequently employed hybrid development method is between an organization and on-premises infrastructure to expand the overall set-up into the cloud and link the cloud resources to its in-house core system.



The on-premises deployment model is employed for its ability to provide organizations with maximum resource utilization. It is basically referred to as on-premises resource delivery using various virtualization and resource management tools, which has lent it the name private cloud. Although the on-premises deployment does not do justice to the huge benefits cloud computing proffers, its ability to facilitate the connectivity between on-premises infrastructure and cloud kept resources makes it a sought-after deployment model of high-profile organizations.



## **Service Model**

To understand AWS deployment, it's important to have a basic awareness of cloud computing's main types. IaaS, PaaS and SaaS each function to a different capacity but essentially have similar jobs. They do a certain amount of the heavy-lifting and simplify functions in the cloud that would otherwise require a ton of infrastructure to perform.

### **Aws works as: -**

#### **1.) Infrastructure as a Service (IaaS)**

Infrastructure as a Service, sometimes abbreviated as IaaS, contains the basic building blocks for cloud IT and typically provide access to networking features, computers (virtual or on dedicated hardware), and data storage space.



## 2.) Platform as a Service (PaaS)

Platforms as a service remove the need for organizations to manage the underlying infrastructure (usually hardware and operating systems) and allow you to focus on the deployment and management of your applications.



## 3.) Software as a Service (SaaS)

Platforms as a service remove the need for organizations to manage the underlying infrastructure (usually hardware and operating systems) and allow you to focus on the deployment and management of your applications.



## Virtualisation

Amazon Elastic Compute Cloud (EC2) instances are the central part of Amazon.com's cloud computing platform, Amazon Web Services (AWS). An instance type determines the hardware of the host computer used. Each instance type offers different compute and memory capabilities. Amazon Machine Image (AMI) provides the software profile of the EC2 instance

including OS, applications installed, services started by default, etc.

Thus, EC2 allows scalable deployment of applications by providing a web service through which a user can boot an AMI to create a virtual machine, which Amazon calls an “instance”, containing any desired software. AWS supports two different types of virtualization for EC2 instances:

1. Para Virtualization (PV)
2. Hardware-assisted Virtual Machine (HVM)

## **Framework**

The five pillars of framework are:

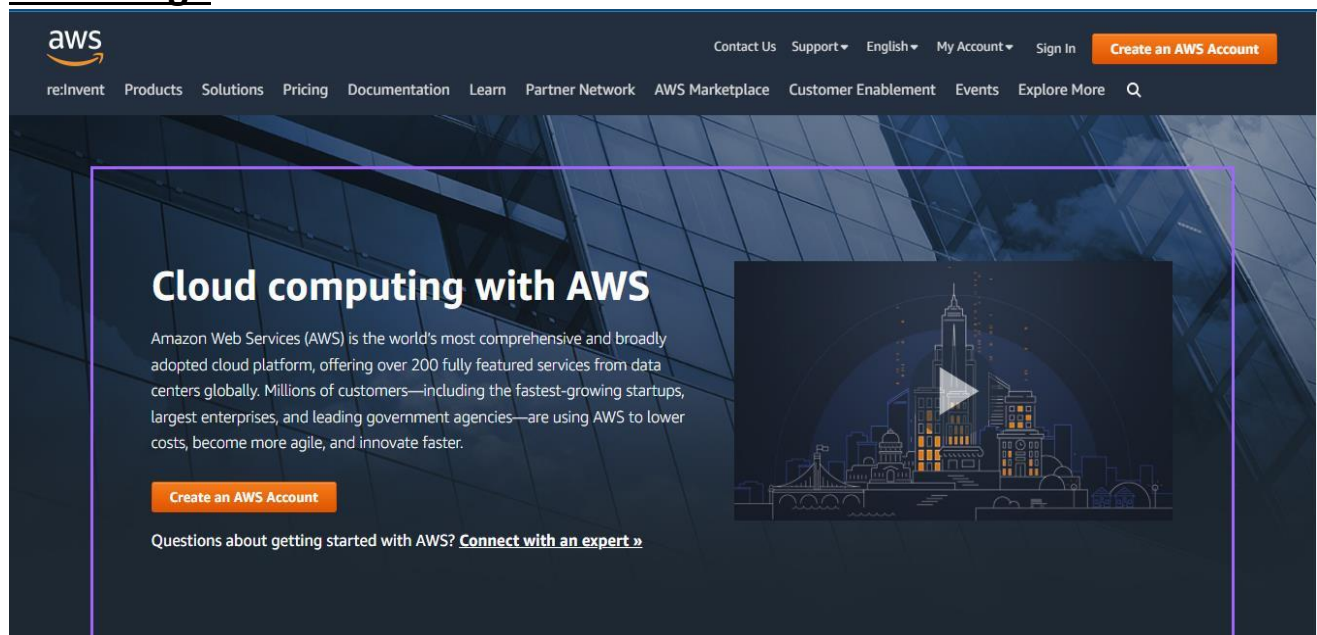
- Operational excellence
- Security
- Reliability
- Performance efficiency
- Cost Optimisation

## **Characteristics**

- Most functionality
- Largest community of customers and partners
- Largest community of customers and partners
- Most proven operational expertise

# Hands on experience


## Home Page



The screenshot shows the AWS homepage with a dark blue header. The AWS logo is on the left, and navigation links (Contact Us, Support, English, My Account, Sign In) and a 'Create an AWS Account' button are on the right. Below the header is a horizontal menu with links: re:Invent, Products, Solutions, Pricing, Documentation, Learn, Partner Network, AWS Marketplace, Customer Enablement, Events, Explore More, and a search icon. The main content area features a large hero section with the title 'Cloud computing with AWS'. To the left of the title is a paragraph about AWS being the world's most comprehensive cloud platform. Below this is another 'Create an AWS Account' button and a link to 'Connect with an expert'. To the right of the text is a video player showing a city skyline at night with a play button in the center.

aws

Contact Us Support English My Account Sign In [Create an AWS Account](#)

re:Invent Products Solutions Pricing Documentation Learn Partner Network AWS Marketplace Customer Enablement Events Explore More 

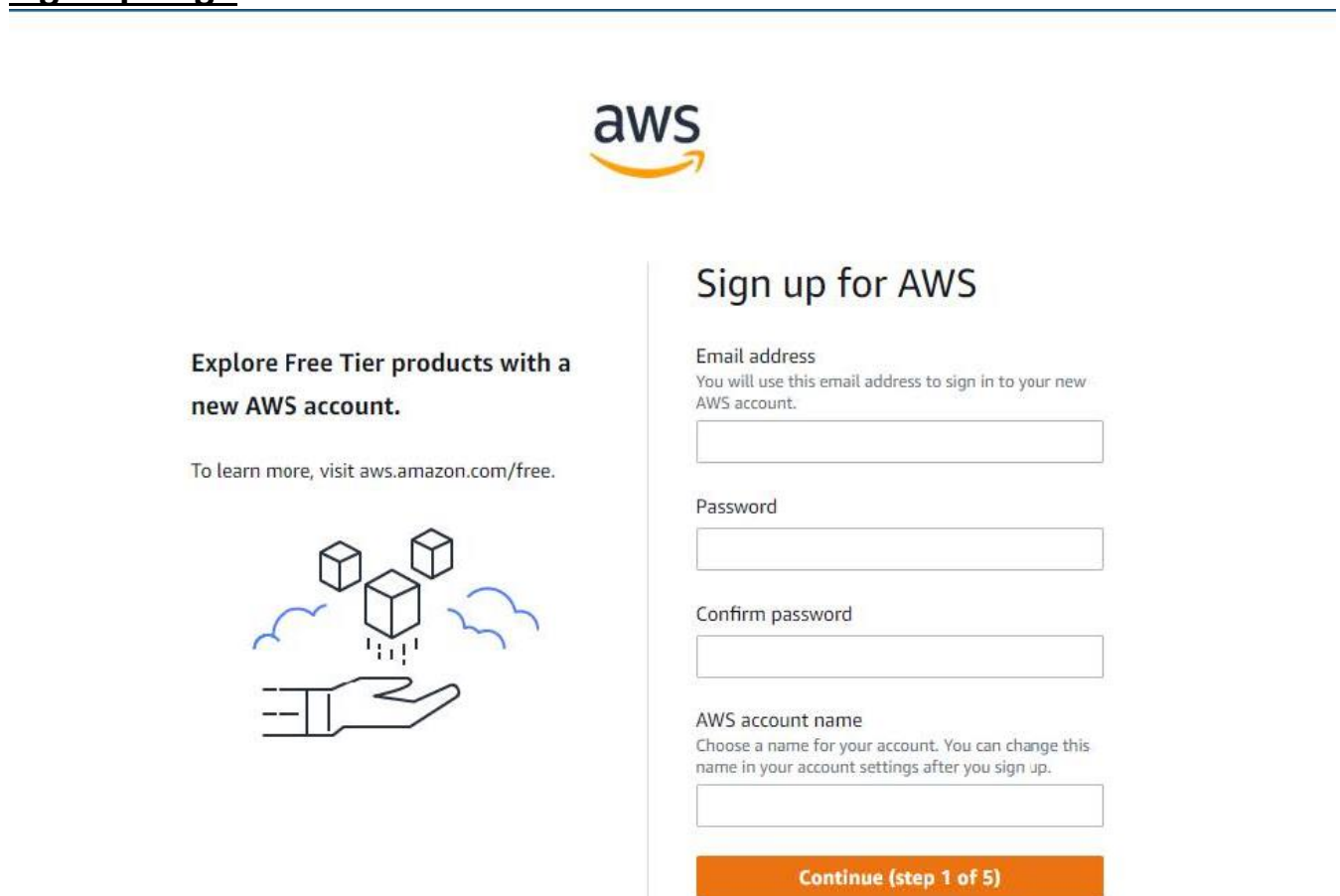
### Cloud computing with AWS

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centers globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

[Create an AWS Account](#)

Questions about getting started with AWS? [Connect with an expert »](#)

## Sign Up Page



The screenshot shows the AWS sign-up page. At the top is the AWS logo. Below it, on the left, is a section titled 'Explore Free Tier products with a new AWS account.' with a link to 'aws.amazon.com/free'. Below this is an illustration of a hand holding three cubes. On the right is a form titled 'Sign up for AWS' with fields for 'Email address', 'Password', 'Confirm password', and 'AWS account name'. Each field has a descriptive sub-header and a brief instruction. At the bottom of the form is a 'Continue (step 1 of 5)' button.

aws

### Sign up for AWS

**Email address**  
You will use this email address to sign in to your new AWS account.

**Password**


**Confirm password**

**AWS account name**  
Choose a name for your account. You can change this name in your account settings after you sign up.

[Continue \(step 1 of 5\)](#)

**Explore Free Tier products with a new AWS account.**

To learn more, visit [aws.amazon.com/free](https://aws.amazon.com/free).



# **Case Study 3**

## **Google Workspace/ G-Suite**

### **Introduction**

Google Workspace (formerly known as Google Apps and later G Suite) is a collection of cloud computing, productivity and collaboration tools, software and products developed and marketed by Google. It was first launched in 2006 as Google Apps for Your Domain and rebranded as G Suite in 2016. Google Workspace consists of Gmail, Contacts, Calendar, Meet and Chat for communication; Currents for employee engagement; Drive for storage; and the Google Docs suite for content creation. An Admin Panel is provided for managing users and services. Depending on edition Google Workspace may also include the digital interactive whiteboard Jamboard and an option to purchase such add-ons as the telephony service Voice. The education edition adds a learning platform Google Classroom and today has the name Workspace for Education.

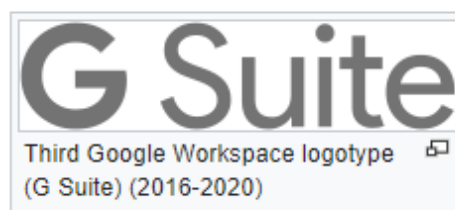
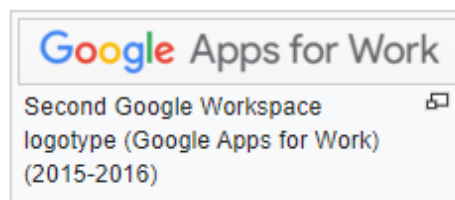
### **History and motivation**

From February 10, 2006, Google started testing a version of the service at San Jose City College, hosting Gmail accounts with SJCC domain addresses and admin tools for account management. On August 28, 2006, Google launched Google Apps for Your Domain, a set of apps for organizations. Available for free as a beta service, it included Gmail, Google Talk, Google Calendar, and the Google Page Creator, which was later replaced with Google Sites. Google announced an edition for schools, then known as Google Apps for Education, on October 10, 2006.

Google announced that Google Apps would be rebranded as G Suite on September 29, 2016. Then, on October 25, 2016, Google launched the first hardware product for G Suite, the Jamboard; a 55-inch digital whiteboard connected to the cloud.

Google announced that G Suite would be rebranded as Google Workspace on October 6, 2020, and that Workspace would emphasize increased integration between the apps, such as the ability to create Docs from within Chats, or start a Meet call from within a presentation.

On June 14, 2021, Google announced that Google Workspace would be available to consumers with a Google Account, along with the ability for users to fully switch from Google Hangouts to Google Chat, the rebranding of the "Rooms" feature in Gmail to "Spaces", a new "Google Workspace Individual" tier, a progressive web app for Workspace applications, and more.



## **Deployment Model**

The cloud deployment model refers to applications that are deployed and run entirely in the cloud. There are two ways in the cloud. First, they are either created in the cloud. Second, they are migrated to the cloud from their current infrastructure. The low-level infrastructure fragments can accommodate the development of cloud-based applications.

Google Workspace uses Google Cloud Platform which was created by Google. Google Cloud Platform (GCP), is a suite of cloud computing

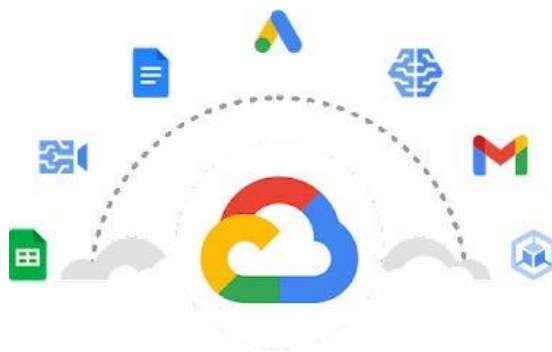
services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search, Gmail, Google Drive, and YouTube. Alongside a set of management tools, it provides a series of modular cloud services including computing, data storage, data analytics and machine learning. Registration requires a credit card or bank account details.

Google Cloud Platform provides infrastructure as a service, platform as a service, and serverless computing environments.

## **Service Model**

Google Workspace or G Suite works as:

**Software as a Service (SaaS):** Software as a service is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. SaaS is also known as "on-demand software" and Web-based/Web-hosted software.



## **Virtualisation**

Let's look at what virtualization technology Google must be using:

**Access virtualization** – Google makes it possible for an individual to access many different applications from just about any type of intelligent device over just about anyone's network without having to know where that application is hosted, what operating system that server is running or even where that server is located.

**Application virtualization** – Google has developed its own technology making it possible for many instances of a given application to be running inside of Google's network. An individual has no idea where the given instance he/she is using is running. If one instance of an application fails,



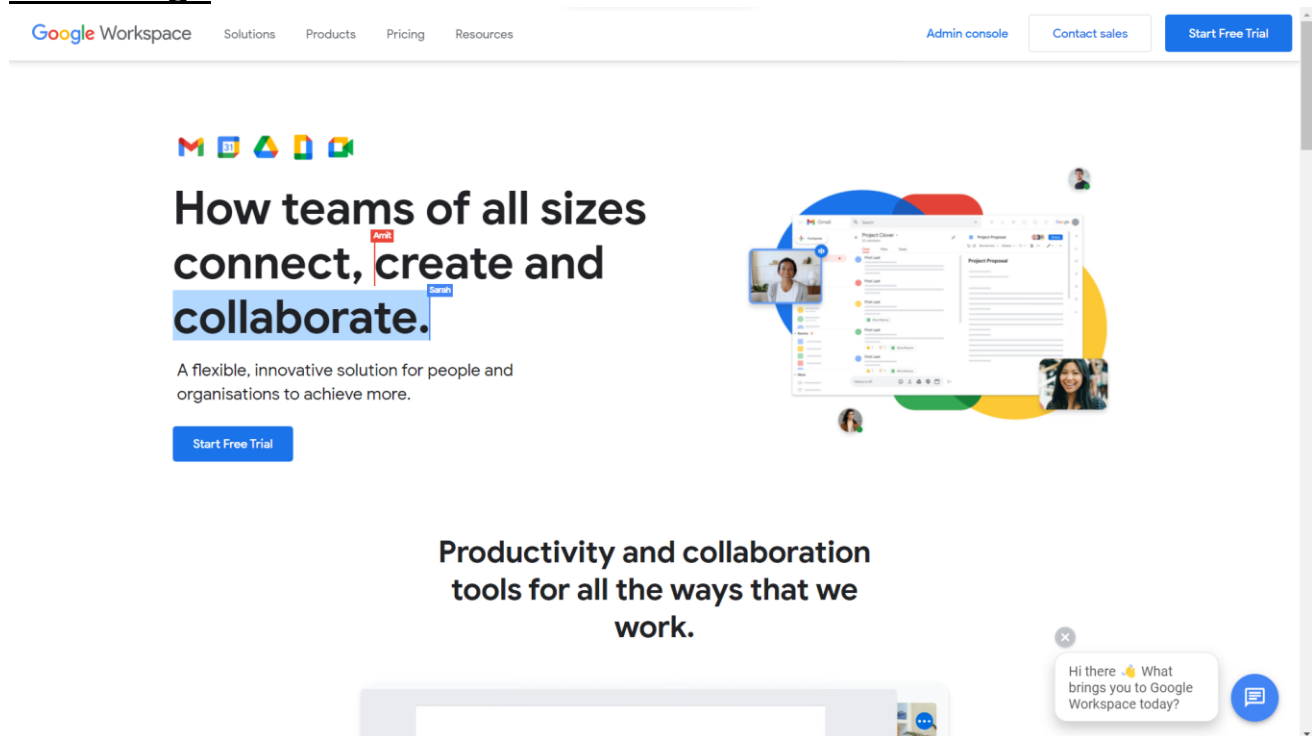
all one needs to do is attempt to access it again and another instance will be found.

**Processing virtualization** - Google has developed its own workload management software that allows multiple instances of applications to reside on different hosts in different places in its network. If something fails, the individual requesting a given application is connected to a different instance.

**Storage virtualization** - Google has developed applications so that the data and the application rules processing reside on different, often redundant, systems in the network. It is pretty clear that applications do not need to know where and on what media type the data lives.

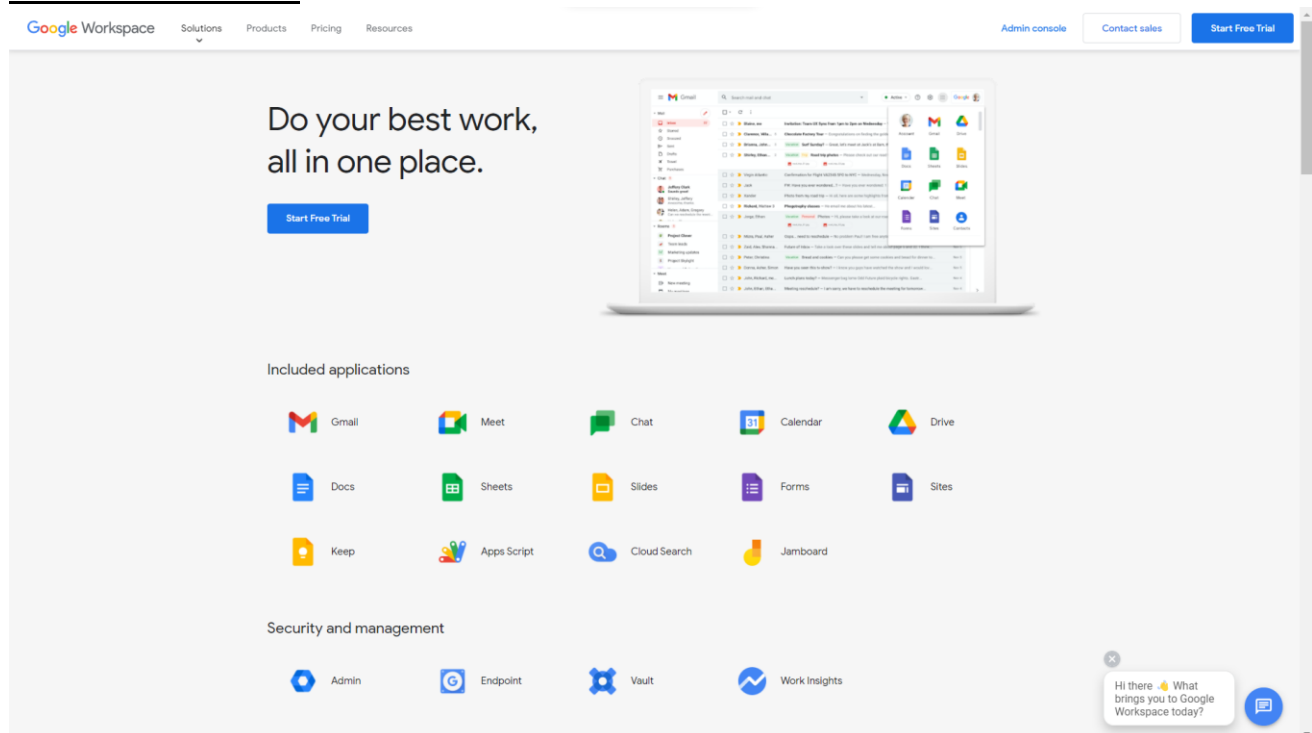
# Hands on experience

## Home Page



The screenshot shows the Google Workspace Home Page. At the top, there is a navigation bar with the Google Workspace logo and links for Solutions, Products, Pricing, and Resources. On the right side of the navigation bar are links for Admin console, Contact sales, and a Start Free Trial button. The main content area features a large heading "How teams of all sizes connect, create and collaborate." with the word "collaborate." highlighted in a blue box. Below the heading is a subheading "A flexible, innovative solution for people and organisations to achieve more." and a Start Free Trial button. To the right of the text is a circular graphic showing a collage of Google Workspace applications like Gmail, Google Meet, and Google Docs, with small profile pictures of people. Below this, there is a section titled "Productivity and collaboration tools for all the ways that we work." and a chat bubble that says "Hi there! What brings you to Google Workspace today?" with a close button (X) and a speech bubble icon.

## Services Offered



The screenshot shows the Google Workspace Services Offered page. At the top, there is a navigation bar with the Google Workspace logo and links for Solutions, Products, Pricing, and Resources. On the right side of the navigation bar are links for Admin console, Contact sales, and a Start Free Trial button. The main content area features a large heading "Do your best work, all in one place." and a Start Free Trial button. Below the heading is a laptop displaying a collage of Google Workspace applications. Under the heading "Included applications", there is a grid of icons for Gmail, Meet, Chat, Calendar, Drive, Docs, Sheets, Slides, Forms, Sites, Keep, Apps Script, Cloud Search, and Jamboard. Below this, there is a section titled "Security and management" with icons for Admin, Endpoint, Vault, and Work Insights. On the right side, there is a chat bubble that says "Hi there! What brings you to Google Workspace today?" with a close button (X) and a speech bubble icon.

# **Case Study 4**

## **VMware**

### **Introduction**

VMware is a leading provider of multi-cloud services for all apps, enabling digital innovation with enterprise control.

VMware, a leader in virtualization technology, has come up with enterprise cloud computing solutions. Having been a dominating player in the virtualization domain, VMware is currently providing a range of products for the development of private and public clouds and for leveraging the services offered by both as a hybrid cloud, such as VMware vCloud Director, VMware vCloud Datacentre Services, VMware vSphere, and VMware vShield to name a few.

### **Foundation and Motivation**

The VMware story begins on February 10, 1998, in sunny Palo Alto, California. It is here that five forward-thinking technologists, all passionate about creating a better way to compute, come together to form VMware, Inc. with Diane Greene as CEO.

### **Deployment model**

The cloud deployment model refers to applications that are deployed and run entirely in the cloud. There are two ways in the cloud. First, they are either created in the cloud. Second, they are migrated to the cloud from their current infrastructure. The low-level infrastructure fragments can accommodate the development of cloud-based applications.

VMware provides various solution to the digital business:

- Build new cloud-native apps, modernize existing apps, and operate infrastructure that serves them all across any cloud.
- Take advantage of the innovation and freedom of every cloud with the simplicity of one
- Accelerate modern app operations with network and security virtualization for WAN, data centre and cloud.
- Enable any employee to work anywhere, anytime with seamless employee experiences

- Leverage your infrastructure across any app, any cloud and any device for intrinsic security at every layer.
- Deliver any application, on any cloud, anywhere—from the core and the RAN to the edge and cloud.



#### App Platform

Build new cloud-native apps, modernize existing apps, and operate infrastructure that serves them all across any cloud.



#### Multi-Cloud

Take advantage of the innovation and freedom of every cloud with the simplicity of one.



#### Networking

Accelerate modern app operations with network and security virtualization for WAN, data center and cloud.



#### Anywhere Workspace

Enable any employee to work anywhere, anytime with seamless employee experiences.



#### Security

Leverage your infrastructure across any app, any cloud and any device for intrinsic security at every layer.



#### Telco Cloud

Deliver any application, on any cloud, anywhere—from the core and the RAN to the edge and cloud.

## Service Model

To understand VMware deployment, it's important to have a basic awareness of cloud computing's main types. IaaS, PaaS and SaaS each function to a different capacity but essentially have similar jobs. They do a certain amount of the heavy-lifting and simplify functions in the cloud that would otherwise require a ton of infrastructure to perform.

Private clouds can be created by using the VMware vSphere and VMware vCloud Director.

- **VMware vSphere** is a robust virtualization platform used to transform IT infrastructures into virtual storage, compute, and network resources and provide them as a service within the organization. VMware vSphere provides services at both the infrastructure and application levels.
- **VMware vCloud Director**, coupled with VMware vSphere, is a software solution that enables enterprises to build secure, multitenant private clouds by pooling infrastructure resources into virtual datacentres and exposing them to users through web-based portals and programmatic interfaces as fully automated, catalog-based services.
- **VMware vShield** technologies are used to provide security to these environments by using services like perimeter protection, port-level firewall, NAT and DHCP services, site-to-site VPN, network isolation

- **VMware vCloud** Datacenter Services and VMware vCloud Express offer efficient solutions for utilizing IaaS either as a public cloud or a hybrid cloud. vCloud Express is an IaaS offering delivered by leading VMware service provider partners



# Hands on experience

## Home Page

vmware®


Apps & CloudNetworkingWorkspaceSecurityBy IndustryPartnersResources

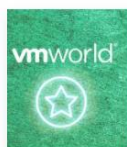
VMware Dell Spin-off Deal Successfully Completed >

### Innovate Faster in a Multi-Cloud World

Go fast, spend less, and be free with VMware Cross-Cloud services.

[LEARN HOW](#)





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Celebrating Stories of Innovation



Distributed Workforce with Anywhere Workspace

## Sign Up Page

Welcome to  
VMware Cloud Services

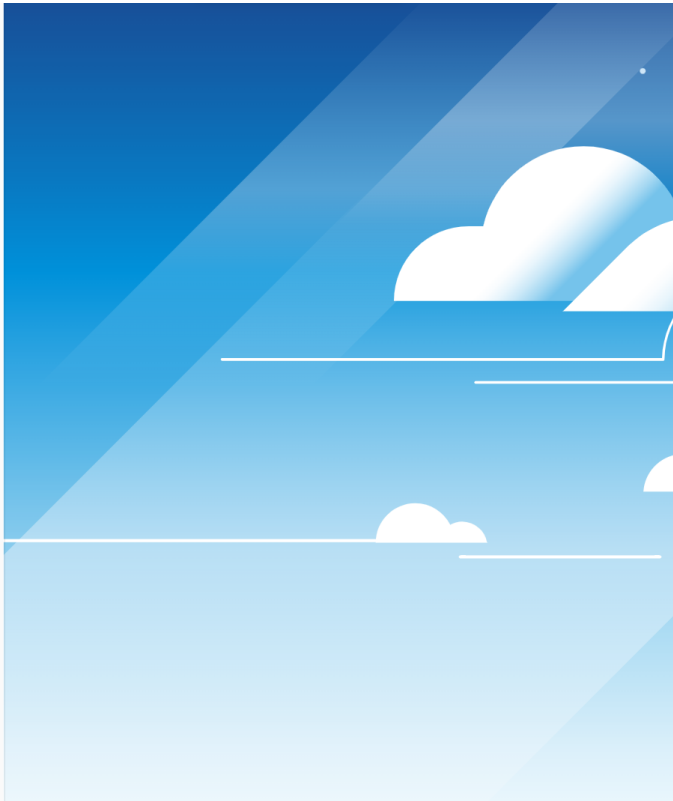
Sign in with your VMware account

Email address

NEXT

New to VMware Cloud?

CREATE YOUR VMWARE ACCOUNT



ENGLISH ▾  
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# **Case Study 5**

## **Meghraj by NIC**

### **Introduction**

In order to utilise and harness the benefits of Cloud Computing, Government of India has embarked upon an ambitious initiative - "GI Cloud" which has been named as "MeghRaj". The focus of this initiative is to accelerate delivery of e-services in the country while optimizing ICT spending of the Government. This will ensure optimum utilization of the infrastructure and speed up the development and deployment of eGov applications.

### **Foundation and Motivation**

The architectural vision of GI Cloud encompasses a set of discrete cloud computing environments spread across multiple locations, built on existing or new (augmented) infrastructure, following a set of common protocols, guidelines and standards issued by the Government of India. Two Policy reports viz., "GI Cloud Strategic Direction Paper" and "GI Cloud Adoption and Implementation Roadmap" have been prepared by Meity which provide the data and other specifications for the deployment of Meghraj.

### **Meghraj Cloud Model**

National Informatics Centre (NIC) provides various cloud services via Meghraj to host websites, portal and web applications with the speed and scalability that businesses demand. NIC Cloud Services offers variety of service model to meet different requirements such as:

#### **Platform as a Service (PaaS):**

PaaS provides pre-installed web and database servers so that we can publish and run web application without worrying about server setup. The servers are pre-configured and ready with basic security hardening. Using PaaS services we can quickly deploy servers and publish web applications. The OS & Application Software licenses are provided by us as part of offering.

### **Infrastructure as a Service (IaaS):**

IaaS provides us with basic virtual compute infrastructure resources like CPU, Memory, Disk Storage attached to blank VMs allowing us to install OS, using ISOs, from scratch and customization. However, we have to use our own licenses for OS and Application software (if any).

### **Software as a Service (SaaS):**

Meghraj provides on demand software service. SaaS is a software delivery model where users are not responsible for supporting the application or any of the components. The server infrastructure, OS and software is being managed by cloud services. If we are having web application and want to distribute it to users, we can use Cloud Service to deliver through Software as a Service.

## **Meghraj Services Offered**

### **Storage as a Service:**

This provides you on demand storage of various types including file storage and block storage etc. File and Block storage are methods to store data on NAS and SAN storage systems. Each storage volume can be treated as an independent disk drive and it can be controlled by external server operating system.

### **Load Balancer as a Service:**

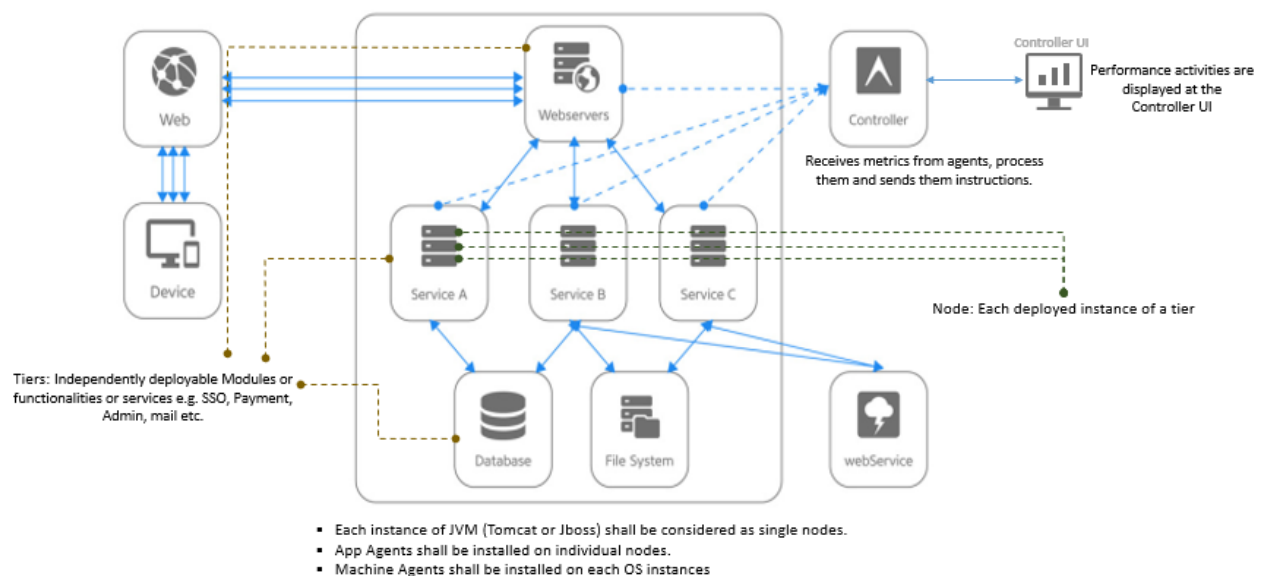
Load balancing Service allows us to efficiently get incoming network traffic requests distributed across a group of back-end servers (e.g. server farm / server pool). This service is available on demand for critical application requiring high availability and easy workload manageability.

### **Resource Monitoring as a Service:**

Real-time monitoring of IT resources is critical to ensure availability of systems and reduce outages and performance issues. This becomes more critical because IT Infrastructures are often comprised of multiple locations cloud deployments. In such scenario, it is a challenge for IT team to quickly identify and correlate problems before they affect end-users and ultimately the productivity of the organization. To overcome this challenges NIC cloud has launched a new service to provide Resource Monitoring (RM) capability to its users. Resource monitoring as a service enables cloud users to monitor real time performance of the cloud infrastructure and to



analyse past resource usage, performance and outage trends to manage resources effectively and to utilize them efficiently. It also provides insights for developing future strategies of expansion.



NIC's resource monitoring service enables a cloud user to have real-time as well as historic visibility of cloud resources like VM uptime, CPU & Memory usage, disk-usage, network-usage; and monitoring of availability of processes & websites through remote network port monitoring. The service also provides website monitoring through URL. It also enables users to receive immediate alerts, if any incident occurs.

NIC provides a dashboard to its cloud users through which users can monitor and analyse the utilization and performance of virtual machines and its resources like RAM, CPU, storage, network and processes and view active alerts about them.

### **Vulnerability Assessment Service:**

This service helps you to assess your Servers and networks for identifying the security vulnerabilities i.e., threats and risks they pose. A vulnerability assessment process detects and classifies system weaknesses in Servers, networks and communications equipment and predicts the effectiveness of countermeasures.

### **Application Performance Management (APM) Service:**

Application Performance Management (APM) provides the monitoring and management of performance, availability and user experience of software applications. APM service helps users to monitor, detect and diagnose

complex application performance problems to maintain an expected level of service.

NIC's APM service is an agent-based solution for managing the performance, availability, and user experience of applications and is offered as Software-as-a-Service from NIC National Cloud. The service is based on client server model where monitoring agents shall be installed on the various components of application delivery eco system (that needs to be monitored) to collect performance data. The data shall be sent to the APM server (which is managed by NIC APM team) which shall analyze the collected data and present actionable insights through a dashboard with drill down capabilities.

### **Data Analytics (DA) as a Service:**

Data Analytics as a service (DA-SaaS) refers to the provision of analytics software and operations through web-delivered technologies. These types of solutions offer businesses an alternative to developing internal hardware setups just to perform business analytics.

Advanced analytical techniques and tools make this possible and offer new ways in which the data can be mined to generate insights, from retrospective analysis to prospective analysis, helping the decision makers look into the future and plan accordingly.

At its core a data analytics platform requires a robust infrastructure capable to store and process huge amount of data. The Data Analytics Service of NIC enables user to build an infrastructure of such capabilities. The infrastructure shall be hosted in the NIC National Cloud and provides an alternative to setting up capital-intensive in-house data analytics infrastructure.

### **Artificial Intelligence as a Service:**

Artificial Intelligence (AI) is the simulation of human cognitive processes by machines. For this machine learns from data both structured and unstructured. AI models can be built using supervised learning, or semi-supervised learning, where the system can be used to search for patterns in the data and cluster them, and in next stage use such classes for further model training. However usually users do not have the necessary resources to harness AI because data crunching is a computationally intensive job.

In order to solve the problem of lack of AI infrastructure NIC provides these facilities through the cloud:

**AI as a Service:** NIC plans to build a platform that will help AI users to start work on Data Annotation using open-source tools for creating the training dataset and then to facilitate users for training the model using a supercomputing development platform and open-source AI development frameworks. This development platform is being made available by NIC through NIC AI Cloud, and further it plans to help users deploy the model by building an Inference Platform for deployment. AI Models that have been matured can also be offered to the users for further development work as part of AI Development Platform as a Service.

**Text, Image & Video Analytics:** Image analytics can be used for Object detection, face verification etc., and Video analytics can be used for detection of children head count in ICDS scheme videos, traffic analysis etc. On the other side textual analysis is very important for sentiment analysis in social media feedbacks, making recommendations, text analytics & text summarization etc.

**Chat/Voice Bot:** It can be used for answering Frequently asked questions (FAQs) reducing help desk queries, can be used to answer specific application-based queries and their voice counterparts can be used to answer user queries in Hindi and English where citizens are illiterate and can answer queries like agricultural produce prices at a mandi, register a complaint from the user for deficiency in services etc.

### Others:

Several other smaller services are also provided by the national cloud which include S3WaaS: Website as a Service, Public IP Service, Anti-virus Service, Web Application Firewall (WAF) Service among others.

 Some AI services that have been provided by means of Meghraj till now are: -

- **AI Satyapikaanan** : It is the face verification AI that is deployed in some places in the basic stage for testing and is needed for verifying you are who you claim to be by verifying our facial identity. It is needed for contactless online security.
- **AI VANI:** It is a "Chatbot as a Service" which can help you build layered-modular-pluggable chatbots, following the indigenously

developed VANI “Virtual Assistant of NIC” framework. The framework consists of various modules which are capable to perform API integration to back-end systems, queue management, agent monitoring and live handover to human agents and can be added to the chatbot as required.

# Hands on Experience

## Home Page

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MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY



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NIC Cloud Coordinators

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सबका प्रयास

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Get the power of NIC cloud services to host your websites, portal and web applications with the speed and scalability that your business demands.

Get NIC Cloud Services

## Cloud Service Sign-up Page

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### Get NIC Cloud Services

Tell us a little about your Organization and Our Support Team will be in touch soon.

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Designation

Designation

Email

Email (off.)

Mobile

Mobile

Type the code shown below (case sensitive)

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Submit

## Service Offered

### Services

Get the power of NIC cloud services to host your websites, portal and web applications with the speed and scalability that your business demands. NIC Cloud Services offers variety of service model to meet your requirements like Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Software as a Services (SaaS).



#### PaaS

##### Platform as a Service

PaaS provides pre-installed web and database servers so that you can publish and run web application without worrying about server setup.

[More](#)

#### IaaS

##### Infrastructure as a Service

IaaS provides you basic virtual compute infrastructure resources like CPU, Memory, Disk Storage attached to blank VMs with allowing you to install OS.

[More](#)

#### SaaS

##### Software as a Service

SaaS is a software delivery model here users are not responsible for supporting the application or any of the components.

[More](#)

#### Storage

##### Storage as a Service

This provides you on demand storage of various types including file storage and block storage etc. File and Block storage are methods to st...

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#### Load Balancer

##### Load Balancer as a Service

Load balancing Service allows you to efficiently get incoming network traffic requests distributed across a group of back-end servers (e.g. ...

[More](#)

#### RM

##### Resource Monitoring as a Service

This service helps you to monitor the cloud resources utilization and its availability with allowing you to analyse the utilization trends f...

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#### VA

##### Vulnerability Assessment Service

This service helps you to assess your Servers and networks for identifying the security vulnerabilities i.e. threats and risks they pose. A...

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#### Backup

##### Backup Service

Allows you to backup the data and application code lying inside the Cloud Servers based on various parameters like frequency, retention peri...

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#### APM

##### Application Performance Management

Application Performance Management (APM) provides the monitoring and management of performance, availability and user experience ...

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#### DA

##### Data Analytics (DA) as a Service

Data Analytics as a service (DA-SaaS) refers to the provision of analytics software and operations through web-delivered technolo...

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#### Agile Service

##### Agile as a Service

Agile development is combination of frameworks, tools and software practices adopted by self-organizing teams for delivering fast...

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#### Load Testing

##### Load Testing as a service

Load Testing helps in validating the application design and server infrastructure for expected concurrent user load wherein the s...

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#### Artificial Intelligence

##### Artificial Intelligence as a Service

Artificial Intelligence (AI) is the simulation of human cognitive processes by machines. For this machine learns from data both s...

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#### S3WaaS

##### S3WaaS: Website as a Service

Website as a Service (WaaS) provides you website design, development, hosting, maintenance and updates services through S3WaaS. S...

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