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# Cloud Computing Case Study on Microsoft Azure

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**Abstract**—Cloud computing is an emerging paradigm that provides a promise to revolutionize the way the software development industry operates. In this paper, we perform a thorough case study of Microsoft Azure a popular cloud computing platform. We thoroughly study various key concepts and features provided by this platform. This study will provide researches and in-depth understanding of various aspects of Microsoft Azure.

## I. INTRODUCTION

A rapid growth in networking technologies and newly enabled features has resulted in a tremendous growth in user data and computation capability requirement for application design [1]–[8]. Cloud computing is a promising new paradigm that provides agility, scalability and efficiency to the software design methodologies of the information technology (IT) industry. Further, its use can enable the design and development of various new applications for wireless communication use cases [9]–[13].

Microsoft Azure is a cloud computing platform and infrastructure created by Microsoft for building, deploying, and managing applications and services through a global network of Microsoft-managed data centers. It provides both PaaS and IaaS services and supports many different programming languages, tools and frameworks, including both Microsoft-specific and third-party software and systems.

Azure Storage is massively scalable, so a user can store and process hundreds of terabytes of data to support the big data scenarios required by scientific, financial analysis and media applications. Further, the user can store the small amounts of data required for a small business website. Such capabilities are also required for development of new analytic features [14]–[16]. Wherever the user needs fall, the users pay only for the data they store.

Azure Storage currently stores tens of trillions of unique customer objects, and handles millions of requests per second on average.

## II. BENEFITS OF AZURE STORAGE

Azure Storage supports clients using a diverse set of operating systems (including Windows and Linux) and a variety of programming languages (including .NET, Java, and C++) for convenient development. Azure Storage also exposes data resources via simple REST APIs, which are available to any client capable of sending and receiving data via HTTP/HTTPS.

## III. DETAILS OF MICROSOFT AZURE WEBSITES

Microsoft Azure Web Sites is implemented as websites that are dynamically created on-demand on servers running Windows Server 2012 and IIS 8.0. When a client posts a request to a web site, Microsoft Azure Web Sites dynamically provisions the site on one of the Azure virtual machines pointing it at content stored in Azure Storage containers. The Azure Virtual Machines are deployed in groups called "Stamps", which may contain hundreds of such machines. Microsoft deploys these stamps in its Azure centers across the world, and adds more stamps as demand grows

## IV. SERVICES PROVIDED BY MICROSOFT AZURE

**Microsoft lists over 50 Azure services including:** Azure Active Directory B2C, Azure Active Directory, Azure Active Directory Domain Services, API Management, Application Gateway, Visual Studio Application Insights, App Service, Automation, Backup, Batch, BizTalk Services, CDN, Cloud Services, Azure Container Service, Data Catalog, Data Factory, Data Lake Analytics, Data

Lake Store, Azure DevTest Labs, AzureDNS, DocumentDB, Event Hubs, ExpressRoute, HDInsight, Azure IoT Hub, Key Vault, Load Balancer, Machine Learning, Managed Cache Service, Media Services, Mobile Engagement, Mobile Services, Multi-Factor Authentication, Notification Hubs, Operational Insights, Redis Cache, RemoteApp, Scheduler, Search, Security Center, Service Bus, Service Fabric, SiteRecovery, SQL Database, SQL Data Warehouse, SQL Server Stretch Database, Storage, StorSimple, Stream Analytics, Traffic Manager, Virtual Machines, Virtual Network, Visual Studio Team Services, VPN Gateway.

## V. KEY FEATURES PROVIDED BY MICROSOFT AZURE

The key features of Microsoft Azure are covered below:

### A. Compute

These services provide virtual machines, containers, batch processing and remote application access.

- App services, platform as a service (PaaS) environment letting developers easily publish and manage web sites.
- Websites, high density hosting of websites allows developers to build sites using ASP.NET, PHP, Node.js, or Python and can be deployed using FTP, Git, Mercurial or Team Foundation Server. This feature was announced in preview form in June 2012 at the Meet Microsoft Azure event. Customers can create websites in PHP, ASP.NET, Node.js, or Python, or select from several open source applications from a gallery to deploy. This comprises one aspect of the platform as a service (PaaS) offerings for the Microsoft Azure Platform. It was renamed to Web Apps in April 2015.
- WebJobs, applications which can be deployed to a Web App to implement background processing. That can be invoked on a schedule, on demand or can run continuously. The Blob, Table and Queue services can be used to communicate between Web Apps and Web Jobs and to provide state.

Refer to fig. 1 to view various services covered under Compute feature of Microsoft Azure.

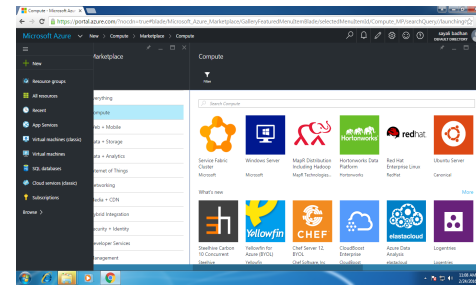


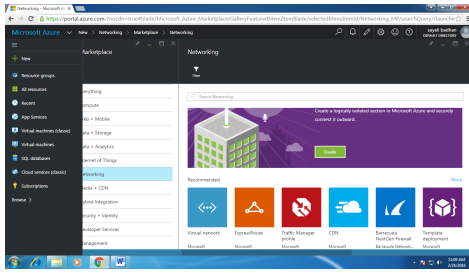
Fig. 1: Services under Compute feature

### B. Networking

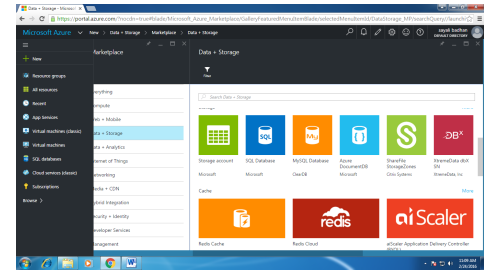
This group includes virtual networks, dedicated connections and gateways, as well as services for traffic management, load balancing and domain name system (DNS) hosting.

- Virtual Network, a hosted Virtual private network
- Azure DNS, a DNS domain hosting service. It provides domain name resolution services using the cloud infrastructure of Microsoft Azure. The Azure DNS services are integrated with other Azure services in terms of APIs, billing, credentials. The Azure DNS service is built up on the highly scalable cloud infrastructure provided by Microsoft Azure. The deployment is Anycast based and the service has a high global footprint to provide faster network resolution. Azure DNS is currently open for public preview.
- Express Route allows creation of private connections between Azure datacenters and infrastructure that's on your premises or in a colocation environment. ExpressRoute connections don't go over the public Internet (sometimes called "dark fiber") and offer more reliability, faster speeds (it's like a leased line), lower latencies (one hop to Azure), and may offer higher security than typical Internet connections. In some cases, using ExpressRoute connections to transfer data between on-premises systems and Azure can also yield significant cost benefits.

Refer to fig. 2 to view various services covered under Networking feature of Microsoft Azure.



**Fig. 2:** Services under Networking feature



**Fig. 3:** Services under Data+Storage feature

### C. Data+Storage

This category includes Database offerings for SQL and NoSQL, as well as unstructured and cached cloud storage. Azure Storage provides the flexibility and hyper-scale needed to store and retrieve large amounts of data. Use Azure Blob Storage (Object Storage) to store unstructured data, such as documents and media files. Use Azure Table Storage for structured NoSQL data. Use Azure Queue Storage to reliably store messages. And use SMB-based Azure File Storage for existing or new applications—no code changes are required.

- SQL Database, formerly known as SQL Azure Database, works to create, scale and extend applications into the cloud using Microsoft SQL Server technology. It also integrates with Active Directory and Microsoft System Center and Hadoop.
- Azure Search provides text search and a subset of [OData]’s structured filters using REST or SDK APIs.
- DocumentDB is a NoSQL database service that implements a subset of the [SQL] SELECT statement on [JSON] documents.
- Redis Cache is a managed implementation of Redis.
- StorSimple manages storage tasks between on-premises devices and cloud storage.

Refer to fig. 3 to view various services covered under Data+Storage feature of Microsoft Azure.

## VI. CONCLUSION

In this paper, we study about one cloud computing platform: Microsoft Azure. First, we study what is Microsoft Azure. Following this, we go through its benefits and various services provided by Microsoft Azure. Finally, we explore different

features provided by Microsoft Azure like compute, data+storage, Networking in detail.

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