Cloud Security in Microsoft Azure

Archana Devi Kapali Vijayakumar

Abstract:

This paper evaluates the Security aspects of cloud computing and its implementation using Microsoft Azure. Cloud services are quite abstract without a set of well-defined Features and according to user requirements, there are several solutions available on market of Cloud computing. Researchers around the world are using Microsoft Azure to enable them to accelerate their research. Microsoft Azure provides an open, flexible, global platform that supports multiple programming languages, tools, and frameworks allowing researchers to achieve faster results and achieve more using the cloud.

. Keywords-- **Cloud, Cloud Computing, Microsoft Azure, PaaS, SaaS, IaaS, Data Centers, Virtual Machine.**

I. INTRODUCTION

Microsoft Azure includes many services. But to research on service that fall into the category of computing and storage. A wide variety of computing resources available within Microsoft azure such as websites, virtual machines, database as a service, Hadoop as a service etc. Microsoft Azure is a public cloud computing Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Software as a Service (SaaS) that can be used for services such as analytics, virtual computing, storage, networking and much more. Millions of developers and IT professionals already rely on and trust Azure public cloud services support the same technologies. When you build on, or migrate IT assets to, a public cloud service provider you are relying on that organization's abilities to protect your applications and data with the services and the controls they provide to manage the security of your cloud-based assets.

II.CLOUD COMPUTING

Cloud is an abstract, virtual environment where programs and data are stored. In cloud computing power is provided by data centers, which can contain systems for data storage and many servers that have the ability to manage almost any software, and customers pay flexibly according to the resources used, based on a monthly fee. Also in Cloud Computing users do not need to buy software or maintain expensive servers and devices for data storage, this leads to significant reduction of expenses, office space, and internal staff for IT support and increase of data security [1-2].

We can identify that the main components for Cloud Computing are:

1) Clients defined by terminals or common computers whose benefit are small hardware costs, small IT costs, security, lower power consumption, easy repair and replacement etc.
2) Data centers consist of collections of servers where subscription applications are hosted. These can rely on a large hall in the same building or a room of servers outside the organization and may contain virtualized servers for which the software can be installed allowing multiple instances of virtual servers that can be used [6]. A lot of virtual servers can run on one physical server (multi-tenant).
3) Distributed Servers that should not be located all in the same location but in disparate geographic locations. In reality if something happens to a site, such as a power failure, the service may be accessed from another site.

III. SERVICES PROVIDED BY AZURE

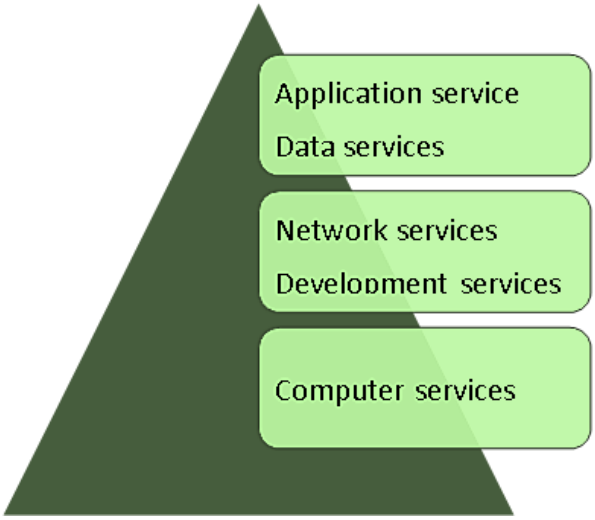


Fig.1 Major Services in Microsoft Azure.

A. Application Service

These services help individuals advance, arrange, and uphold diverse applications on the Platform. This embraces components such as Azure hardware, Azure Media Services, Azure Active Directory, Azure IoT, Azure Analytics, and Azure AI [4].
Among these, the most significant include: Explore the whole family of Azure data, AI, tools, and digital applications:

	Microsoft Fabric
	Azure Machine Learning
	Azure App Service

B. Data Services

All the managing and storing of information is performed in the Cloud. Azure gives a lot of data services. Azure SQL Database, Document DB, storage, Radis Cache. Unstructured and structured data can be kept using data storage services provided by Azure. It is secure and scalable and guarantees the safe incorporation of on-premises data with cloud data. Individuals and organizations can keep all sizes and types of data like NoSQL, queue, file, bob, and big file to small lumps, which can be executed as per the needs of the business without influencing the production environment [5].

C. Network Services by Azure

Network Services execute network processes inside Azure and on-premises infrastructure and Azure. These contain Azure Content Delivery Network, Azure-provided DNS, Virtual Network, Traffic Manager, and ExpressRoute.
Azure CDN gives high bandwidth content to dispense big files. This leads to a decrease in the time that the file downloads. Application load and latency are also condensed by improving them from the whole delivery process of the content. The file is cached to Azure Datacenter that is nearby.

D. Development Services

Various development tools and services provided by the Platform can improve software deployment and development like Azure DevOps.

1. Azure DevOps

It automates the delivery method of the software system. It improves expansion by offering a substitute to the CI/CD servers that are self-managed and supply open DevOps tools. It also offers trustable and fast tools to assist in hassle-free delivery.

E. Compute Services

Application capabilities are run and hosted by the use of the Azure compute services.
These include Azure App Services, Azure Service Fabric, Azure Batch, Azure VMs, and Azure Container Service.

1. Azure Virtual Machines (VMs)

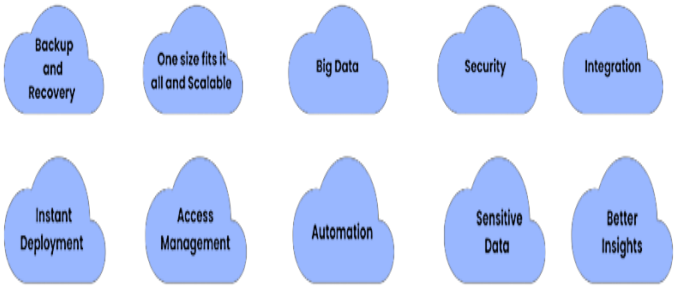
It is a highly demanded and scalable means. The cloud managers must select an OS, organize the required properties, and fashion the webserver [9]. There is no need to buy and maintain any hardware.

2. Azure Container Service

One can utilize Azure and benefit from container-based modern expansion practices. To

migrate, service fabric can be used. There is also a provision to deploy and keep images using Azure Container Registry or Docker Hub. A most significant benefit is that less space is used than virtual machines, and it begins instantly where the process.

III. BENEFITS OF AZURE



1. Scalability and Flexibility

One of the key benefits of Microsoft Azure is its unmatched scalability and flexibility. Whether your business is experiencing rapid growth or needs to accommodate seasonal fluctuations, Azure allows you to effortlessly scale your infrastructure up or down as per your requirements[7].

2. Security and Compliance

Azure also affords role-based access control, allowing organizations to control who has access to their data and applications. Additionally, it make available of encryption at rest and in transit, ensuring that data is protected throughout the entire lifecycle.

3. Cost Savings

One of the prime benefits of Azure is its cost savings. It can lead to significant cost savings for the businesses. With Azure, there are no direct costs for hardware or infrastructure, and organizations only pay for the services they use. This means that businesses can reduce their capital expenditures and operational expenses, while still having access to the latest technology and topographies.

4. Disaster Recovery and Business Continuity

Disaster recovery and business stability are desperate for businesses of all range. Microsoft Azure provides a range of services to help organizations protect their data and applications in the event of a disaster. Azure Backup also provides automated backups for virtual machines and applications, ensuring that critical data is always protected.

5. Improved Collaboration and Productivity

Microsoft Azure provides a range of tools and services to improve collaboration and productivity for businesses. Azure also provides a range of collaboration tools, including Microsoft Teams and SharePoint. These tools allow employees to collaborate on documents and projects in real time, improving productivity and teamwork.

6. Advanced Analytics and Business Intelligence

Finally, Microsoft Azure provides a range of advanced analytics and business intelligence tools to help organizations gain insights from their data. Azure provides a range of services, including Azure Machine Learning and Power BI, allowing businesses to analyze their data and gain insights to improve decision-making.

7. Global Reach and Availability

Azure operates a vast network of data centers strategically located across the globe. This global presence ensures that businesses can access Azure's services and applications with minimal latency, regardless of their geographical location.

8. Hybrid Capabilities

Azure's hybrid capabilities enable businesses to seamlessly integrate their on-premises infrastructure with the cloud. With Azure Hybrid Benefit, businesses can optimize licensing costs by utilizing their existing investments in Microsoft software licenses.

IV.CONCLUSION

Cloud computing now creates opportunities for all researchers to find patterns or anomalies in their data even with a limited budget. Furthermore, the lower cost of storage means the research community at large can curate and share data, promoting deeper collaboration within the community and enabling data mashups with the potential to reveal new insights. Microsoft Azure provides the necessary cloud platform to reduce not only the time to discovery, but also the cost of discovery. Now is the time to try Microsoft Azure for yourself and discover firsthand how easy it is to set up and go live.

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