# THE HYBRID CLOUD AND MICROSOFT AZURE

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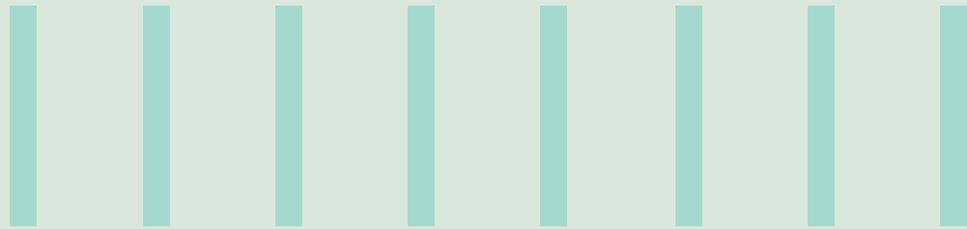
## Introduction

From millennia, "rain bearing clouds" have brought cheer to the humble farm folk growing our food. The recent past has seen the proliferation of a different type of cloud (the "public IT cloud"), and the resultant cheer spread to a different set of farm folk (the ones who help grow businesses by tending to server farms). These "infra-farmers" help organizations harvest significant savings in costs and an improved IT/business agility by using the public IT clouds to host their server infrastructure.

Just like rain bearing clouds are sometimes obstructed by mountains; and are consequently unable to confer their generosity upon farmers in "rain-shadow" areas; our "infra-farmers" faced a similar problem with the public IT clouds. Only this time, the virtual mountains were made up of government regulations, technology limitations, existing investments in on-premise infrastructure, data confidentiality needs, business domain limitations (e.g. banks, government departments), need for highly responsive applications, need for control, etc. The best that could be done was for our infra-farmers to have their own "private IT cloud" – until now.

This paper discusses the concept and utility of the "hybrid cloud" model – a model straddling the public and private clouds, to provide organizations control over what portions of their data and infrastructure reside on which side of the public/private boundary. We will also explore how Microsoft Azure brings the concept of the hybrid cloud to reality.

## The hybrid cloud concept

The hybrid cloud is a model where an enterprise divides its infrastructure and data between a private cloud (created with on-premise infrastructure) and the public cloud (refer Fig 1 for a conceptual view of the hybrid cloud). Communication between the public and private clouds is seamless to the deployed applications. Thus, the hybrid cloud allows an enterprise to exercise complete control over those parts of their infrastructure and data where it truly matters, while pushing the other portions to the public cloud.
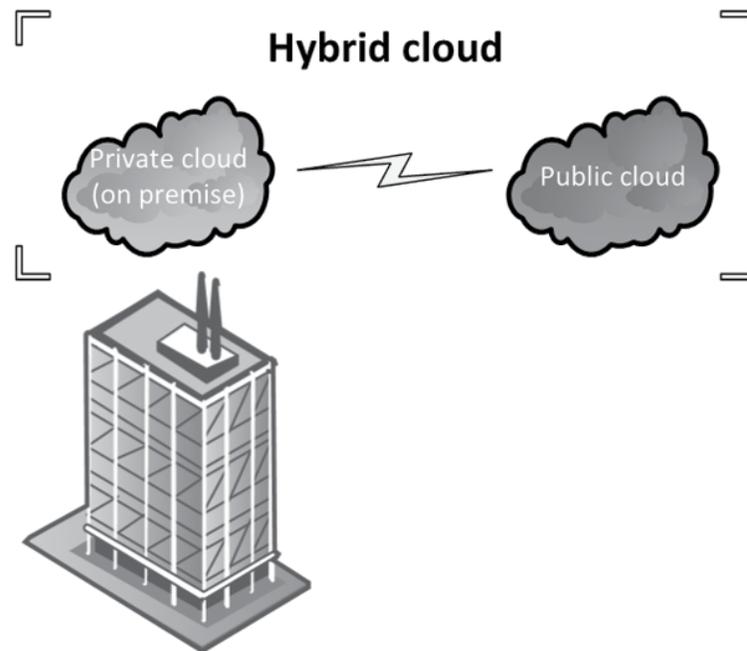


Figure 1: The Hybrid cloud concept

In my view, a successful hybrid cloud should have a few key characteristics:

1. The public and private clouds should be identical in all features, except the ownership and maintenance of the physical infrastructure.

2. With some exceptions, it should generally be possible to leverage an organization's existing infrastructure to setup the private cloud.

3. The processes and toolkits to develop and manage the applications deployed on the hybrid cloud should be the same – irrespective of their residency on the public/private cloud.

4. It should be possible to migrate applications/data between private/ public clouds without rewriting applications.

5. The private cloud should be flexible to grow with the business (with scale-up and scale-out capabilities) just like the public cloud.

6. The hybrid cloud should be a single virtual entity that pools together the private and public clouds. While we should be free to choose where an application is deployed; but within the hybrid cloud runtime, the public/ private cloud boundaries should be invisible.

# Benefits of the hybrid cloud model

My view on the key benefits of moving to the hybrid cloud model are below:

| Regulatory | Business domain | Technology | Cost |
|---|---|---|---|

**Regulatory**
- Comply with government regulations on data residency and confidentiality
- Applications hosted on the public cloud could store their data on private clouds within geographic boundaries determined by government policies

**Business domain**
- Attain freedom from business domain restrictions which prevent a move to the cloud
- Deploy sensitive & non-sensitive applications to private & public clouds respectively
- Move only the non-sensitive features of sensitive applications to public cloud

- Ensure responsive applications
- Host applications requiring faster response times on one/more private clouds which are geographically closer to end users
- Deploy private cloud in geographies where public cloud is unavailable

**Technology**
- Exercise complete control over private cloud infrastructure
- Scale up/out your private cloud infrastructure
- Host the private cloud where it makes business sense

- Benefit from the scale and innovations of public cloud providers
- Implement features like disaster recovery to the public cloud, public cloud analytics, public cloud based IoT
- Leverage the public cloud's ability to rapidly scale as a contingency for peak load scenarios

**Cost**
- Utilize existing investments in on-premise infrastructure
- Setup the private cloud on existing on-premise infrastructure

- Choose how to allocate infrastructure budget
- Choose the right mix between renting the public cloud and creating your own private cloud (opex vs capex)

- Save costs by developing and testing applications on the private cloud before deploying them to the public cloud

## Implementing the hybrid cloud with Microsoft Azure stack

Amazon Web Services, Microsoft Azure, IBM cloud, and Google cloud platform are widely considered as the top providers of public cloud services. Amongst these,

Microsoft has the unique distinction of pioneering the hybrid cloud model through the release of the Microsoft Azure stack.

Microsoft has implemented the Azure stack as a distributable Azure cloud platform. The below graphic (Fig 2) illustrates the Azure stack architecture.
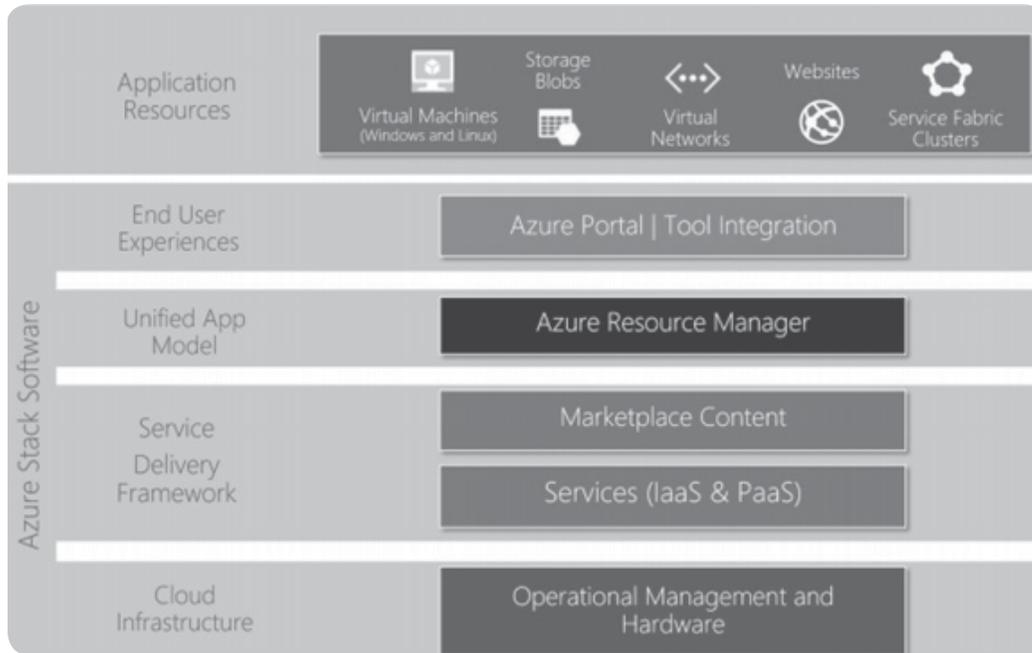


Figure 2: Azure stack architecture (Source: Microsoft Azure official website)

From the above figure, it is clear that the Azure stack is identical to the Azure cloud (they actually share source code). The architecture ensures a consistent experience in UX, operation, deployments, automation, application patterns and toolkits across the Azure stack and Azure cloud. Developers and infrastructure operation managers will be virtually unable to distinguish working between the 2 environments.

The Azure stack is currently available as an integrated system (hardware with pre-installed software). Azure services and customer support are included as a part of the integrated system. The integrated system has to be purchased directly from a select group of Microsoft's hardware partners like Lenovo, HPE, Dell EMC. The integrated servers are grouped together to setup a private cloud from as few as 4 servers. This can later be scaled by adding just a single server. The final hybrid cloud deployment will look something like below (Fig 3).

## The Azure hybrid cloud
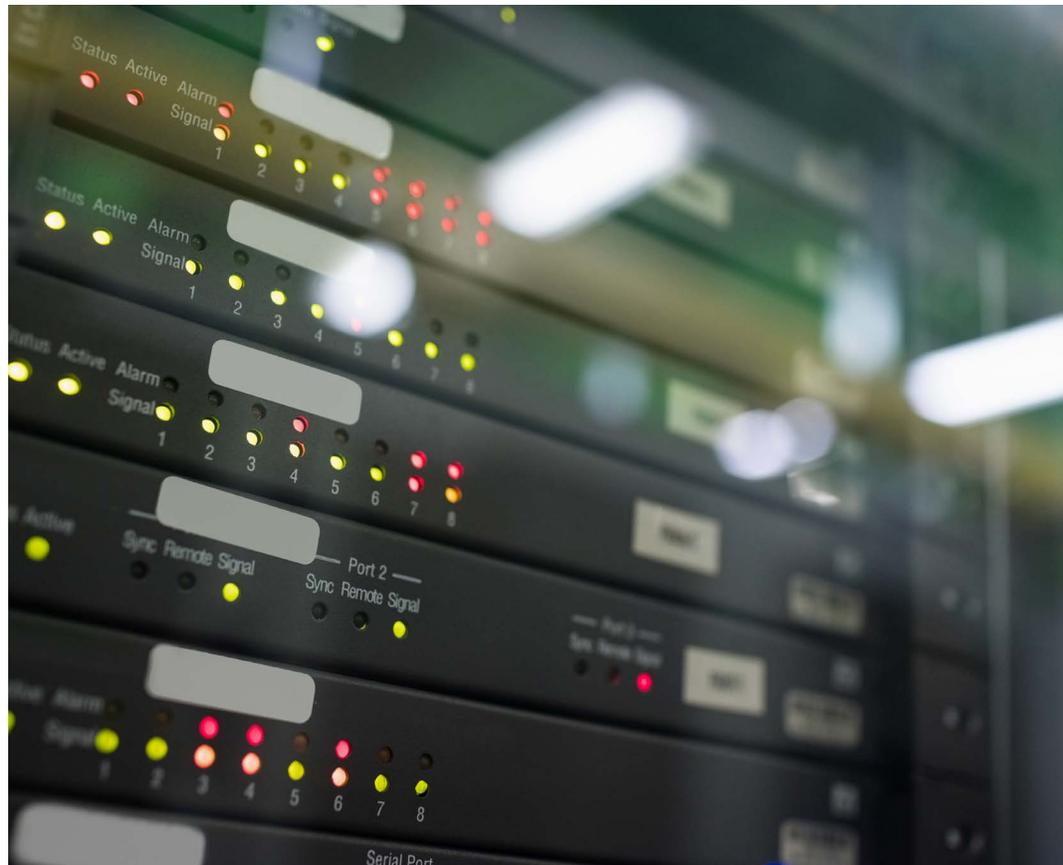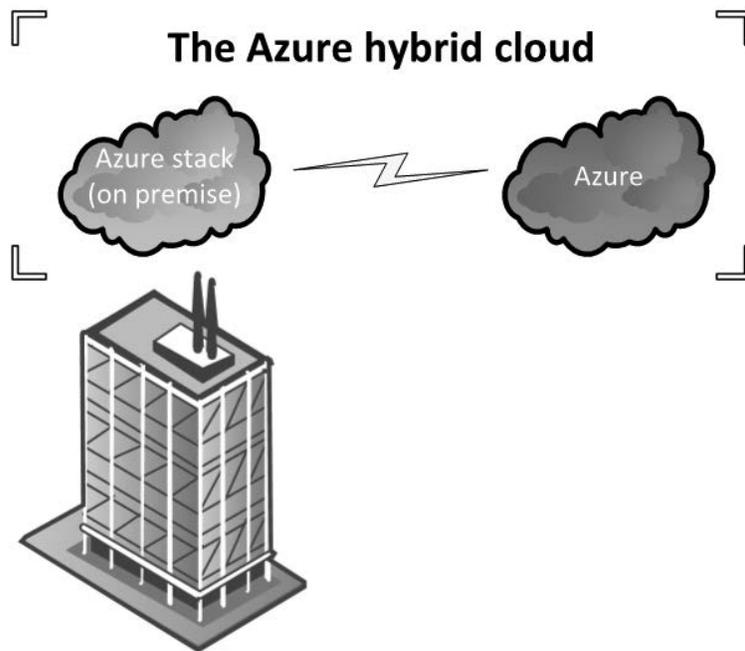


Figure 3: Hybrid cloud with Azure stack

On the pricing front, Azure services on the private cloud are billed based on usage. Since the infrastructure is not owned by Microsoft, the pricing is also lower compared to hosting on the Azure public cloud.

Abundant documentation on the ongoing innovations in the Azure stack is being continuously made available by Microsoft on the Microsoft Azure official website.

## Current limitations of the Azure stack

In my view, the important limitations of the Azure stack are as follows:

1.  The Azure stack is sold as an integrated system of hardware with pre-installed software. It doesn't allow converting existing on-premise infrastructure into a private cloud. Although the Azure SDK is also available separately, it is meant for installation on a single physical server for training/prototyping purposes.

2.  Deploying a multi-region private cloud (Fig 4) is not yet possible, but planned for a future release.
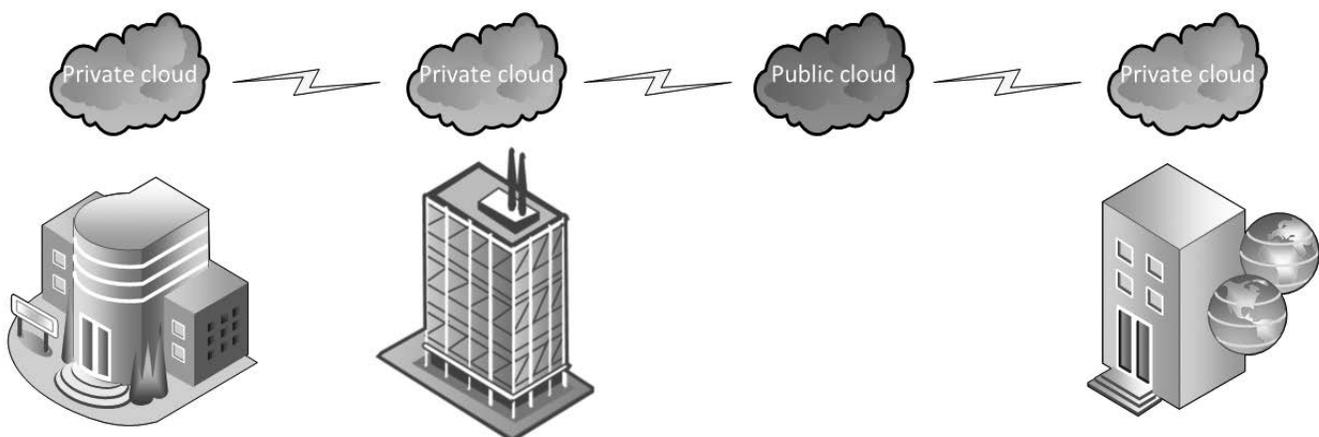


Figure 4: A multi-region hybrid cloud

Let's hope these limitations will soon be addressed by Microsoft.

## Conclusion

The hybrid cloud is a very promising development. By bringing into its fold organizations that hitherto couldn't embrace the benefits of the public cloud, the hybrid cloud will bring a fresh impetus to cloud adoption. Organizations in the public cloud's "rain shadow" regions can now look forward to beginning their cloud journey.

The Microsoft Azure stack is a master-stroke by Microsoft. Being the pioneer and the only one currently with a deployable hybrid cloud stack, Microsoft is set to rapidly gain market share in the hotly contested cloud services market. When combined with Microsoft's cloud applications (like Office365, D365, Artificial intelligence services, Internet of Things, and Analytics services) the hybrid cloud will truly help propagate Satya Nadella's vision of a "cloud-first, mobile-first" world of business applications – eventually evolving into an "intelligent cloud and intelligent edge".

## About the Author

### Satish Dalal
Satish is a Technical Architect with over 11 years of experience in Microsoft Dynamics AX and related areas. He specializes in solution design, performance, system architecture, pre-sales, production system administration and support.

## References and further reading

[1] Microsoft Azure official website

[2] The intelligent cloud and intelligent edge

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