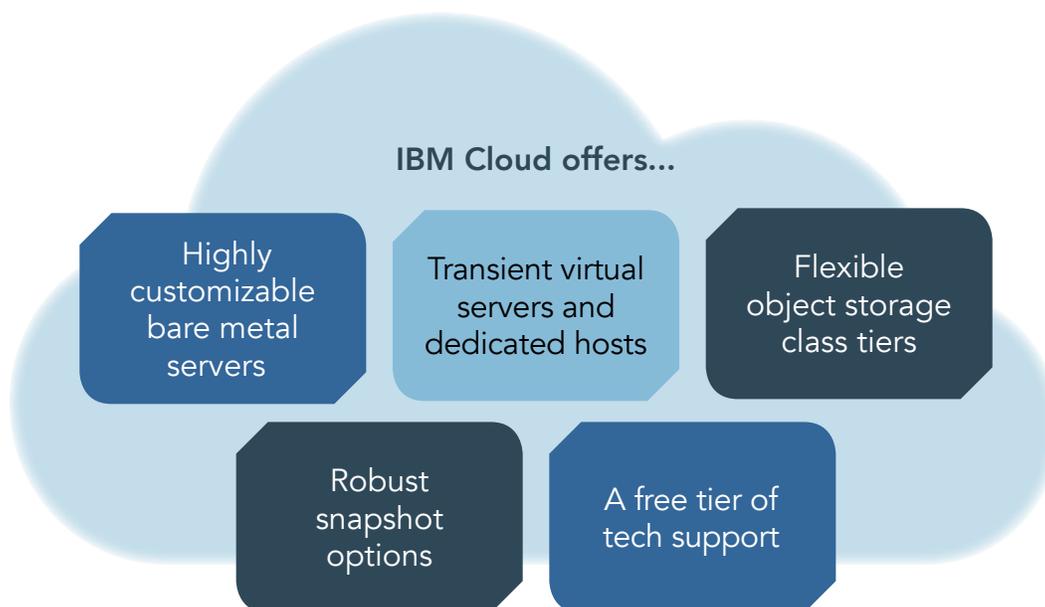




Public cloud infrastructure comparison: IBM Cloud vs. Microsoft Azure

It can be easier for businesses to use cloud computing services from a third-party vendor than to create a cloud solution from scratch. But since every cloud service has unique options, benefits, and drawbacks, it can be difficult to figure out which one best suits your needs.

At Principled Technologies, we compared cloud services from IBM and Microsoft using publicly available information. IBM Cloud is an enterprise, full-stack cloud platform providing public, private, and hybrid environments. This paper presents several areas where organizations may find IBM Cloud provides certain advantages.



Compute

Virtual servers

IBM refers to VMs as virtual servers. While most cloud vendors offer typical VMs that use shared resources, some workloads or SLAs require more specialized compute resources. IBM Cloud offers transient and dedicated-host virtual servers to suit different business needs.

You can create transient virtual servers (or, virtual servers with “spot pricing”) when there is unused capacity available on the IBM Cloud. IBM de-provisions transient virtual servers when full, on-demand virtual servers require more resources. Because transient virtual servers cannot guarantee continual service, they are less expensive than typical configurations—this makes them well-suited for low-priority applications for which service interruption is not a concern.¹ Microsoft Azure customers can only access similar low-priority VMs through Azure Batch, a cluster management tool for large-scale computing.²

IBM Cloud also offers virtual servers with dedicated hosts, which are great for workloads or SLAs that require single-tenant servers. Dedicated virtual servers cater to customers who need physical isolation for certain workloads.³ IBM Cloud dedicated platforms offer several configurations for workloads of all sizes. Microsoft Azure currently offers only two hardware configurations for isolated VMs, which Microsoft will support until at least December 2021.⁴

Bare metal servers

IBM Cloud offers fully customizable bare metal servers. Choose exactly the storage, CPU, RAM, and other specifications you need for your workload and get isolated, dedicated, non-virtualized hardware for your applications.⁵ For even more compute power, you can configure your bare metal servers with NVIDIA® GPUs for AI and machine learning workloads as well as other compute-intensive applications.⁶

Azure customers do not have access to general-purpose bare metal servers. As of this writing, Azure offers bare metal servers only as part of specific SAP HANA® and VMware® environments. The SAP HANA on Azure (Large Instances) service offers the option to deploy SAP HANA on dedicated bare metal hardware—but the hardware is capable of running only SAP HANA.⁷ (Note that IBM Cloud also offers SAP-certified bare metal servers.⁸) As of this writing, bare metal solutions with VMware exist in a limited preview state and are available for VMware workloads that offer a challenge to migration directly to Azure VMs. According to Microsoft, this approach “won’t deliver the cost savings and agility of cloud-native services.”⁹ Businesses that need dedicated, non-virtualized hardware may consider looking to the more robust bare metal offerings from IBM Cloud.

Flexible GPU options from IBM Cloud can help compute-intensive workloads

If you are searching for bare metal solutions for deep learning, AI, machine learning, and other compute-intensive applications, then GPUs are probably going to factor into your considerations. Both IBM Cloud and Microsoft Azure offer GPU options on virtual machines, but IBM is unique in that they offer bare metal GPU as an option. Azure, on the other hand, does not offer GPU options on bare metal servers.¹⁰ IBM Cloud equips bare metal servers with several different GPU options including NVIDIA Tesla P100 and V100 GPUs.¹¹ For applications requiring the additional compute performance of a GPU as well as the benefits of bare metal architecture, IBM Cloud may be the better option.

Block storage

Most cloud providers offer some type of block storage for their customers to attach to VMs to serve I/O to applications. Each application's needs differ, so having flexible block storage tiers is important. IBM presents its block storage as iSCSI devices in two main configurations: Endurance storage, which offers fixed capacity and performance tiers to choose from, and Performance storage, which allows users to vary capacity and performance to better suit their needs. Both IBM block storage types offer up to 48K IOPS.¹²

Microsoft Azure offers block storage as direct-attached storage or Virtual Hard Drives (VHDs). They offer four tiers of storage: Standard HDD, Standard SSD, Premium SSD, and Ultra SSD. Standard HDD delivers up to 2K IOPS, Standard SSD delivers up to 6K IOPS, and Premium SSD delivers up to 20K IOPS. Ultra SSD provides up to 160K IOPS, but this option is only available in a limited preview as of this writing.¹³

Snapshots play an important role in protecting a workload's data, and while both IBM Cloud and Microsoft Azure offer snapshots for their block storage, their approaches differ. With IBM, customers can schedule snapshot creation and set policies for automatic deletion. In case of corruption or other issues, customers may use snapshots to revert volumes to previous points in time.¹⁴ Azure snapshots create a copy of the target VHD, and neither policy nor schedule can delete them. Because an Azure snapshot is not aware of any other disks on the VM, restoring the disk when multiple disks are striped is generally inadvisable. To create a copy of a VM with all disks, the user would need to create an image. This would allow the user to recreate the VM with all drives intact.¹⁵

Object storage

Object storage offerings are common to all cloud providers. IBM Cloud Object Storage comes in five tiers: Standard, Vault, Cold Vault, Archive, and Flex. An organization can sort objects into each tier based on how often they expect to access the data. The Standard tier is for objects with frequently accessed "warm" data, the Vault tier is for infrequently accessed "cold" data, and the Cold Vault tier is for very infrequently accessed data. The Archive tier is offline storage for data that companies do not expect to access, yet must retain regardless.¹⁶

Data retrieval comes at no charge for objects in the Standard tier, though the cost rises with increasingly colder tiers. Inversely, the cost of storage capacity is higher for warmer tiers. IBM changes the pricing for data in the Flex tier based on how often an object is accessed. Charges are lower for infrequently accessed Flex-tier data, the charges for storage are lower, but there's a higher fee for retrieval. If the data retrieval exceeds a capped value, IBM waives the retrieval fees but raise the storage fees. Users can set policies to automatically archive objects after a specified duration.¹⁷

While Azure operates in a similar manner with its four blob storage tiers (Premium, Hot, Cool, and Archive), it does not offer a Flex tier for dynamic data. Azure does, however, have a lifecycle management tool in preview that allows users to create policies that transition data between access tiers.¹⁸ IBM Cloud users can transfer files up to 10 TB to Object Storage buckets, but Azure customers are limited to about 4.7 TB in block blobs and 8TB in page blobs.^{19,20}

If your organization wants to try object storage technology before committing, IBM Cloud offers a free tier where you can use IBM Aspera® High-Speed File Transfer on a per-month basis for as long as you like. The free tier offers the following:²¹

- Up to 25 GB of storage
- Up to 2,000 PUT requests
- Up to 20,000 GET requests
- Up to 10 GB of data retrieval
- Up to 5 GB of public outbound bandwidth

Azure’s free trial account is limited to 5GB storage capacity for one year and a \$280 credit to explore any Azure service for 30 days.²²

Tech support

Tech support is an important part of any cloud service. No matter the quality of the service in question, there will always be a need for troubleshooting or emergency services. While both cloud providers offer different tiers of service, only IBM offers free, 24/7 access to troubleshooting services, support tickets, and the ability to chat with support staff by phone or online messaging.²³ Microsoft requires a minimum support plan of \$29/month before Azure users get access to broader options.²⁴

Research summary

Service	IBM Cloud	Microsoft Azure
Virtual servers	Offers transient virtual servers that save money for workloads that can be interrupted Offers private, single-tenant virtual servers on dedicated hosts	Offers low-priority VMs with Azure Batch only Offers only two private, single-tenant VM configurations
Bare metal servers	Hundreds of highly customizable bare metal configurations Bare metal configurations with NVIDIA GPUs	Two offerings that are directly tied to either SAP HANA or VMware No bare metal configurations with any GPUs
Object storage	Flex tiers for dynamic data Objects can be up to 10TB Up to 25GB of storage for an unlimited time with free tier of object storage	No flex tier; preview of policy-based object movement among tiers Objects can be up to ~4.7 TB or 8 TB depending on the blob storage 5GB of free storage space for one year only
Block storage	Schedule snapshot creation and auto-deletion Up to 48K IOPS with Endurance or Performance tier block storage	Cannot schedule snapshot creation or auto-deletion Up to 20K IOPS on all tiers currently generally available
Tech support	Free level of tech support with ticket, phone, and chat access	No access to tech support resources without a paid tier of support

Conclusion

There are many aspects to consider when choosing a third-party cloud vendor. IBM Cloud offers fully customizable bare metal offerings, flexible object storage plans, and free access to tech support with its cloud services. These advantages could make IBM Cloud the right choice for your company.

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