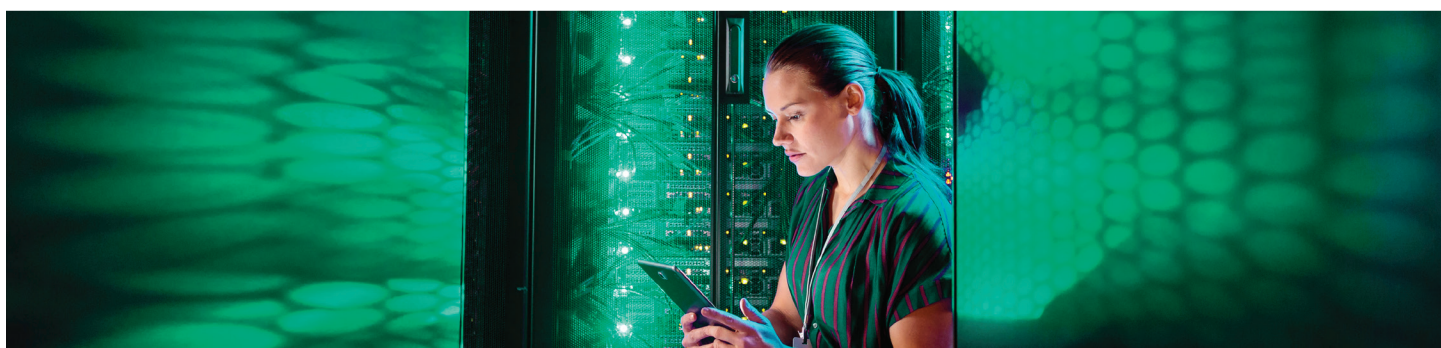
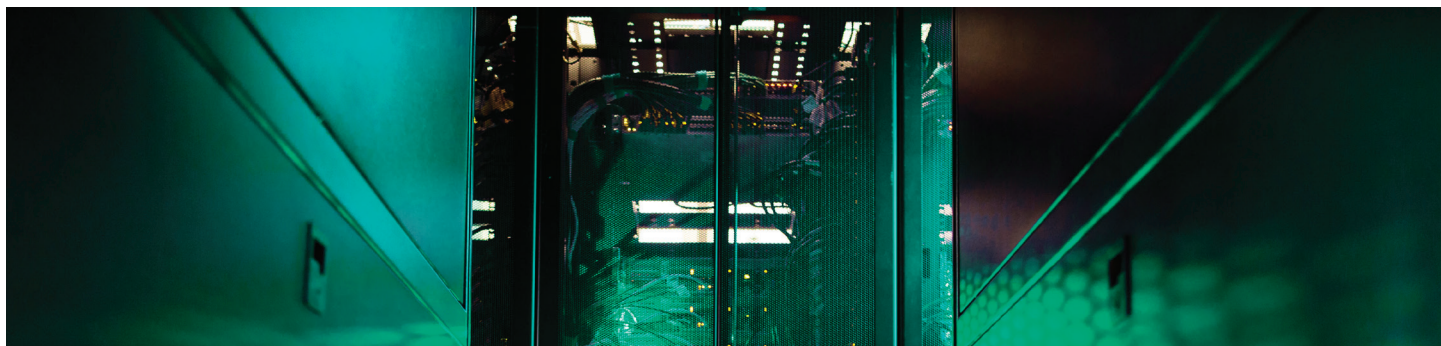




**Hewlett Packard
Enterprise**

Report

Primer: What is hybrid IT and what does it mean for my data center?



As businesses with substantial legacy systems race to adopt cloud and embrace self-service SaaS applications, hybrid IT is quickly becoming the new normal. For those unfamiliar with the concept, here are the answers to common questions about combining clouds and private data centers.

What is hybrid IT?

Many businesses are running hybrid IT without even realizing it. If you're using some combination of a private data center and third-party-hosted cloud to run your business, you've got a hybrid IT model. Often, this situation arises organically when business users "go rogue" or create "shadow IT" by running some of their business processes in a public cloud, outside the purview of Central IT. Depending on the size of the business, different groups may each operate in different clouds while Central IT maintains the company's official data center.

In its ideal form, hybrid IT allows the data center to become a component of a broader suite of technology that includes cloud-based services. This involves transitioning the data center to a virtualized, software-defined infrastructure so it can become a fully integrated part of the hybrid IT environment, with resources that can be provisioned in an automated, self-service fashion.

Is hybrid IT good or evil?

For most businesses, hybrid IT is simply necessary. Despite ongoing cries that the data center is dead and everything belongs in the cloud, the reality is that data centers are still an integral component of most enterprise computing environments. Many businesses have legacy data centers running services or applications that won't be moving to the cloud anytime soon, if ever. Very few organizations are in the position to throw away the investments in IT resources and technologies that are their existing data centers.

At the same time, business units don't care how their services are delivered—just that they are delivered when and where they are needed. While "shadow IT" sounds like a negative evolution, the truth is that business-driven IT, or "LOB IT" as it's sometimes called, lets business users quickly provision their own infrastructure to enable new tools, build new applications, quickly respond to new market developments and customer demands, and drive aggressive growth.

The business need for fast, flexible IT solutions has driven the growth of cloud services. The migration of your legacy data center to a hybrid IT environment will allow your IT department to deliver the benefits of the cloud while mitigating the risks that a pure cloud play can bring.

Unlike unplanned hybrid IT scenarios, which typically involve a mish-mash of disparate systems, scattered capabilities, and data silos, master-planned hybrid IT allows all systems to interact in an optimal manner and can be easily managed, maintained, and secured.





How will my data center need to change to accommodate a hybrid IT approach?

To be able to deliver the capabilities of the cloud from your **data center**, your infrastructure will need to support the private cloud component of the public/private cloud infrastructure. Hybrid IT is a management strategy for effectively and efficiently deploying workloads, not a technology in and of itself. The fundamentals of building a data center haven't really changed; a server is still a box with power and cooling that supports an IT workload. However, a hybrid-IT-ready data center needs to support the following capabilities:

- **Rapid provisioning:** Organizations must have the ability to automate the provisioning of new servers and services.
- **Services on demand:** The central IT model has changed. Services must be available when and where business units need them, delivered from both internal and external resources.
- **Flexible capacity:** Virtualized data center resources can be easily provisioned or scaled down on demand.
- **Management and monitoring:** Perhaps the most difficult aspect to deliver, IT and the business need to be able to manage and monitor services and processes across the on- and off-premises environments to ensure on-time delivery and the availability of necessary services.
- **IT security:** Security remains a major concern as you move into the hybrid IT world. Increasing the flexibility and availability of services, regardless of where they reside, increases the attack surface of your computing environment.

Essentially, moving to hybrid IT means moving to software-defined infrastructure in your data center, which involves moving from specialized to generic hardware, implementing a sophisticated software management layer, and using code to create application environments.

What is a software-defined data center (SDDC)?

Software-defined data centers consist of fully virtualized computing infrastructure that is managed by software in an automated fashion and delivered to end users as a service. The abstraction of CPU, networking, storage, and security allows flexible pools of resources to be seamlessly allocated across workloads as needed, which in turn allows IT to become highly elastic and scalable with vastly simplified operations.

At the most basic level, creating a software-defined data center involves the following steps:

- **Standardization:** Creating scalable systems that can handle big data means using standard hardware, like x86 servers, so that physical capacity can be easily added and managed by IT generalists.
- **Virtualization:** Resource pools are abstracted from physical machines, forming virtual machines that can be clustered into systems to support various workloads.
- **Automation:** Creating code-based policies to manage everything from capacity to security allows the data center to perform many key functions without human intervention and run with optimal efficiency.

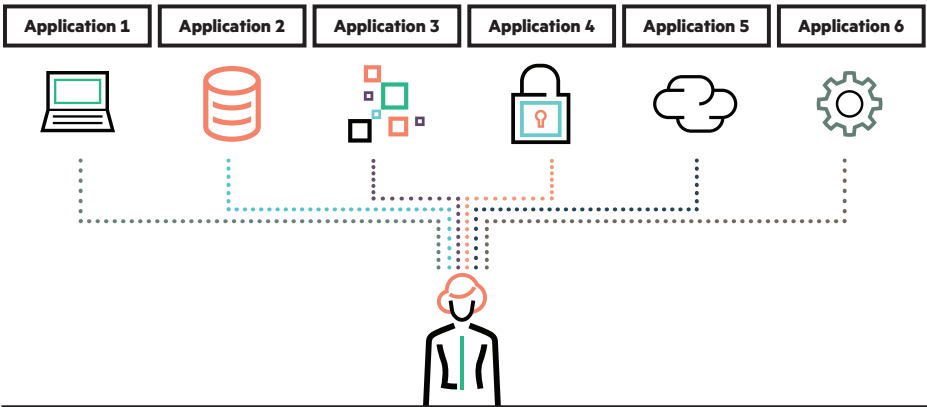
Beyond the server virtualization familiar to IT and users, implementing the SDDC also requires software-defined networking (SDN) and software-defined storage (SDS). Keep in mind that the SDDC is the goal and that both SDN and SDS can be implemented alone, much in the way that server virtualization in the form of virtual machines is commonly provided.



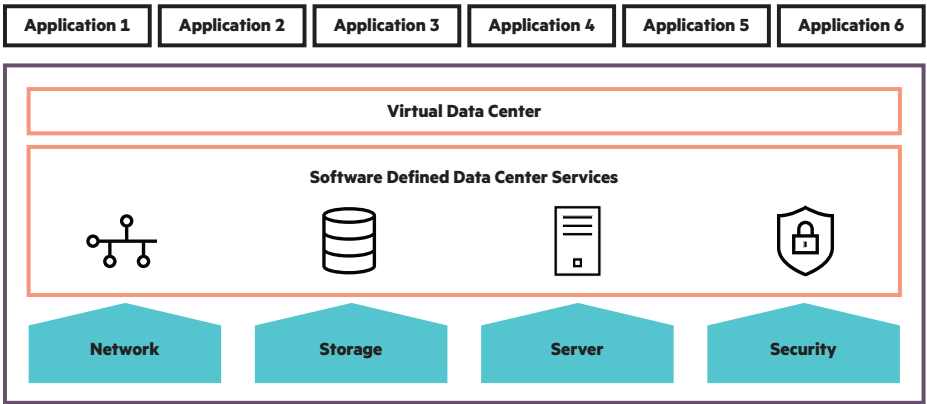
The SDN was really the first of the technologies that arose to help simplify the management and organization of the data center. Data center networking had traditionally been composed of switches and routers that used proprietary protocols and often proprietary management and monitoring tools. The goal of the SDN was to bring open protocols and tools to the network infrastructure, allowing programmatic control and increased flexibility, as provisioning and resources could be handled without a proprietary interface. The goal here is to make the network as flexible as the virtualized server environment. Once again, the network environment is abstracted from the physical infrastructure, with developers and applications not requiring knowledge of the physical infrastructure.

The last basic component of the SDDC is the SDS environment. In many ways, SDS is more straightforward than other virtualization technologies. Though we are still looking at an abstraction layer that removes the need for a direct knowledge of the underlying physical infrastructure, SDS can be pictured as an application that sits on top of the physical storage and manages all of the storage resources. This intelligent software layer, which can also be controlled programmatically, makes decisions about how the storage resources are assigned and is intelligent enough to understand the difference between data that needs to reside on the fastest all-flash array available and that which can be located on slower rotating media or somewhere in between. This includes moving data to external cloud resources.

Traditional view of the Data Center



The Software-Defined Data Center





What technologies enable data center virtualization and hybrid IT?

Optimal technologies for building a modern software-defined data center include:

- **Hyperconverged infrastructure:** In this model, compute, storage, and networking are implemented in a single physical framework, such as a rack or series of racks that are self-contained and allow for the previously discussed virtualization services to be dropped into a data center environment as a discrete component. This reduces complexity and allows for rapid scalability, since adding more capacity means adding more uniform appliances to the data center.
- **Composable infrastructure:** Composable infrastructure goes a step further than hyperconverged. Often referred to as “infrastructure as code,” it is a software-defined solution to the issue of deploying resources for any workload. All available resources are logically pooled and do not require any explicit configuration by an administrator to be made available to a user or application. The software tells a management layer which resources are required for the supplication, and the appropriate resources, ranging from a bare-metal server deployment to a containerized application, are assigned to the task. Composable infrastructure solutions allow you to preserve the value of your legacy data center while expanding your infrastructure to include the cloud services that users demand.
- **Management as a service:** Management-as-a-service offerings, which are cloud-based management tools, can give you the control and monitoring required for SDDCs. The best of these services allow you to manage everything in your infrastructure and provide complete overviews of services and infrastructure, as well as drill-downs into specific services and processes. These capabilities give the user an appropriate view of their environment, whether they are a business unit user who needs to see only how their specific application is performing or an IT administrator responsible for the smooth operation of any or all components of the enterprise.

How do I start designing my hybrid IT system?

It's all about inventorying your workloads and deciding where each needs to live. One-size-fits-all solutions rarely solve any problem, and this is especially true with IT. One of the advantages of the hybrid cloud is that you no longer need to make do when deploying services to your business. The availability of many different types of services, both on- and off-prem, allows IT to deliver solutions that can be the exact match for the business needs. It's important to note that on-prem data centers are still the primary location for business workloads. Many studies have been done, and their findings have been remarkably similar: Roughly 60 percent of business IT workloads reside in data centers.

Additional studies have shown that 60 percent of corporate enterprises see the percentage of their business workloads residing on premises remaining stable or increasing. So being able to deliver on these hybrid IT needs from existing data centers is a priority.



Fundamentally, workloads can reside in three locations:

1. **Within the data center:** This can be your legacy data center, an edge data center, or a physical location or device such as a micro data center. This is a discrete physical location where applications and services are deployed.
2. **Within the private cloud:** This is a cloud environment contained completely within your corporate computing infrastructure. Resources can be provided from any location, and this environment is not dependent on the user connecting to a physical resource.
3. **Within the public cloud:** This location is one that is provided by a public cloud service provider. It can be a set of services that are for exclusive use by the business or a shared service where you access a shared service resource.

Flexibility is the hallmark of the hybrid data center and its function within your internal IT environment. Provisioning, on-demand services, and flexible consumption and capacity can all reside within this internal service as your data center is configured to be the keystone for this environment.

What is the ultimate role of the data center in hybrid IT?

It's already the case that the data center is no longer a single physical structure. Data centers designed for specific roles, such as edge data centers, micro data centers, and backup data centers, are all part of the existing data center environment. But flexibility is key and the "on-demand" service environment is shaping the future of hybrid IT.

In a well-designed hybrid infrastructure, the role of the data center is increased, not diminished. Services that can be delivered from an on-prem infrastructure offer advantages in security and cost control over cloud-based deployments. The advantages that attracted business users to the cloud, ease of deployment, scalability, and on-demand services, can all be deployed from the corporate data centers, as necessary, while compelling cloud-based services can be implemented, as necessary, not within the data center itself, but within the confines of a well-managed infrastructure—this is the promise of **hybrid IT**.

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