

## WHITEPAPER

### **IaaS Insight: *What Is A Cloud Virtual Data Center?***

Virtual Data Centers are populated by total user-defined quantities of virtual resources as opposed to the traditional physical hardware in a colocation or on-premises data center. This includes servers, storage, switches, routers, firewalls, graphics cards and other hardware elements. Users define how much compute, storage, network and security they need to execute all cloud-intended applications and the provider provisions resource pools accordingly.

Virtual Data Centers can be implemented as Virtual Private Data Centers (VPDC) where one or more of the physical infrastructure elements is actually dedicated to one customer before being virtualized, “public” where all elements of the VDC are shared between multiple customers, and hybrid where a customer tethers an on-premises or colocation data center to their Virtual Data Center.

#### **COMPUTE RESOURCES**

In a virtual data center or “VDC”, the user-defined server or “compute” resources from the physical device are virtualized, broken into two resource pools (memory: vRAM and processors: vCPU), and added to the management portal. Customers then use the resource pools to power business applications by creating virtual servers or “VMs”, complete with operating system and application software, and then assigning the necessary storage type/amount to ensure proper performance and data retention.

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This is different from the cloud industry norm where customers purchase compute resources by the VM or cloud server, normally defined with a specific vCPU x vRAM parameter (e.g. 2x8). This can be fine if one's needs are exactly 2x8, but if they are less/more, users end up having to choose whether to overprovision or under provision when deploying an application. Virtual Data Center compute resource pools allow users to map whatever number of vRAM and vCPU they want to a given VM, minimizing waste and optimizing the application with its ideal resource pool.

It is possible to cluster virtual servers (vApp), assign IPv4/IPv6 addresses, and other common activities associated with physical servers.

## **STORAGE RESOURCES**

An on-premises data center will feature storage devices, many of the mid-sized to large companies featuring storage area network (SAN) capabilities complete with controllers, SAS, SATA and SSD drives. Infrastructure managers will connect the SAN to the corporate network and allow employees to use it as a central data repository. Typical vendors include NetApp, EMC, HP and Hitachi Data Systems (HDS) amongst others.

Virtual Data Centers offer the same or similar offering depending on whether it is a fully dedicated Virtual Private Cloud or not. In a fully dedicated VPDC, there is a SAN that is completely dedicated to one customer and networked to the other resources in the VPDC. For most VPDC/VDC environments, the SAN capacity is shared between multiple customers where a single drive or drives are dedicated to one customer to maintain proper separation of customer data. All storage will be delivered by a SAN, complete with

SATA, SAS, SSD drive types and the same controllers you would see in an enterprise data center. These resources are then virtualized and provisioned to the customer management portal in SATA, SAS and/or SSD pools depending on what has been ordered. The customer may then allocate from these total resource pools according to exact specifications and present needs. Customers may tweak the amount of storage allocated to a given VM at any time using the management portal or may even automate the process using scripting.

One difference between the storage capabilities of a VPDC provider like Ajubeo and a traditional public cloud provider is that in the VPDC realm it is possible to map different storage types (SATA, SAS, SSD) to a single virtual server (VM) which can in turn reduce overall storage costs (SAS can cost 2 to 3X SATA).

## **NETWORK RESOURCES**

This is a broad category that will include for our purposes connectivity to the platform, vLANs, accessing the cloud, Internet out (DIA), IP addressing, and cloud-to-cloud links.

Virtual Private Data Center (at least dedicated physical servers to a single customer) providers tend to enable faster/more throughput to the platform due to the dedicated ports on the hardware itself. Some providers will even offer 40 Gbps thanks to carrier-grade networking infrastructure as part of the enterprise cloud stack. This increased throughput can dramatically improve application performance, especially for resource-intensive applications.

Public cloud providers, with numerous customers on a single physical server, by definition must offer shared connections to the platform. Some of the

larger providers restrict throughput to as low as 50 Mbps or less over a shared connection. In stark contrast to the VPDC model, this lack of throughput can lead to poor performance and application timeout.

The VDC or VPDC also enables the user to setup private virtual local area networks or vLANs according to desired corporate or industry best practices for increased security. Management portals are used to establish the connections between virtual resources offering superior speed-to-market thanks to normally easy-to-use portal interfaces. The portal also makes it easy to modify network configuration at any time over a secure connection. Customers may bring their own IPv4 and/or IPv6 addresses or use those of the provider. How the addresses are sold (blocks of X) will vary from provider-to-provider with some CSPs choosing to no longer offer IPv4 addresses due to the scarcity of the global resources. Customers using IPv6 addressing schemes should validate the CSP hardware is IPv6 ready before executing a contract.

Access to the customer VDC/VPDC is most commonly achieved via a VPN connection or direct connection (MPLS extension, fiber) to the platform. While the latter is more expensive and has a longer time-to-market due to carrier provisioning backlog, many sensitive or large customers prefer the option as it enables them to seamlessly extend their network to the cloud. This will provide superior performance and security as opposed to access via VPN over the Internet. MPLS options may require router hosting, so customers choosing this option should validate CSP hosting capability of this kind.

Virtual Data Center providers will also normally offer network services such as dedicated Internet access

(DIA) and inter-site or cloud-to-cloud links, normally via dark fiber. Cloud-to-Cloud links are procured to enable backup and BCDR services in the cloud and are purchased in the same way DIA would be (Mbps/Gbps) with a probable non-recurring cost (NRC) for setup.

## **SECURITY RESOURCES**

VDC/VPDC providers deploy physical firewalls to protect the platform itself and customer environments in the same way an enterprise data center would be architected. Popular types include Fortinet, Cisco, Juniper and numerous others with differentiators including throughput and threat management capabilities.

VDC/VPDC providers may offer dedicated ports on the firewall up to 10 Gbps along with shared connections that are normally more expensive. Virtual domains or “vDoms” can be deployed to provide the customer with unlimited IPSec VPN tunnel capability for one, consistent monthly cost.

Security add-ons like a vShield, vShield Edge, etc. may be included as well as data encryption both in transit and at rest. Customers in search of encryption needs should validate with CSP technical personnel that this is doable as it is not possible to encrypt in a multi-tenant environment with certain storage brands/models.

While the Virtual Data Center inherently costs more than buying a stand-alone VM for customers looking to add on-demand compute capacity for a temporary need, there are numerous benefits.

## **BUYING VIRTUAL DATA CENTERS**

Virtual Data Centers may sound more complex than the credit card public clouds, but buying them is actually easier than the largest market share leader. Instead of projecting utilization percentages, data transfer amounts, calls and requests per 10,000, and other challenging budgeting activity, when buying a VDC/VPDC it is all about the resource pool.

Define how much memory (RAM), processing (CPU), storage (SATA, SAS, SSD), network, and security resources you need and that is what you pay for on a monthly basis. If you need more, simply increase the resource pool and the price is adjusted accordingly. VDC/VPDC invoices tend to be more transparent and predictable than on-demand pay-as-you-go (PAYG) instances.

## **QUESTIONS ABOUT VIRTUAL DATA CENTERS**

If you have any questions regarding Virtual Data Centers (VDC/VPDC), please contact a member of the Nuvalo team at [Sales@Nuvalo.com](mailto:Sales@Nuvalo.com). Our consultants can help you source and compare numerous providers of VDC/VPDC leading to the procurement of a transformative IaaS product that will enable you to deliver more business value than ever before.

## **10 BENEFITS OF THE VIRTUAL DATA CENTER**

- 1. Architectural agility - blank canvas with resource pools as paint, create without limits**
- 2. Buy to current need, then add on-demand saving CAPEX and OPEX as compared to the traditional in-house model**
- 3. Superior platform connection speeds/throughput for improved application performance**
- 4. User defines resource pools to specs, minimized waste**
- 5. Map multiple storage types to a single cloud server/VM**
- 6. Scalability/Elasticity of public cloud with control of in-house/on-prem data center**
- 7. Option for dedicated resources to ensure no “noisy neighbors”**
- 8. User controls rate of CPU/RAM overprovisioning not the CSP**
- 9. More network/access capabilities**
- 10. Increased security with enterprise class firewalls, direct connect, etc**