Virtual1

# 1CLOUD – TECHNICAL DESCRIPTION

1Cloud

# TABLE OF CONTENTS


1. Introduction ..... 3

1.1 Product Introduction ..... 3

1.2 What does a VDC Solution include? ..... 3

2. Key components ..... 4

2.1 Licensing ..... 6

2.2 Billing ..... 6

2.3 Networking ..... 6

2.4 Firewalls ..... 7

2.5 Monitoring ..... 7

2.6 Contention ..... 8

2.7 Backup & Restore ..... 8

2.8 Data Centre Resilience ..... 10

2.9 Access Rights / Security ..... 10

3. Storage ..... 11

4. Further Reading ..... 12

# 1. INTRODUCTION

The purpose of this document is to provide a complete resource for Virtual1's Virtual Data Centre product – 1Cloud.

## 1.1 Product Introduction

A Virtual Data Centre (VDC) is an Infrastructure as a Service (IaaS) solution that provides customers with a highly secure, virtualised hosting environment in which to host their data. This may include their website, email and any other applications as required.

1Cloud is built using Enterprise-grade hardware and software from leading vendors and is designed with the principle that partners and end customers have full control of their server estate, being able to build, spin-up, spin-down and delete their servers using the web interface provided. Partners simply pay for whatever resources they have consumed during the previous calendar month. Charging granularity is down to the nearest hour.

1Cloud is built over two Data Centres, in Docklands and Heathrow; partners are then able to choose which Data Centre to build their servers in.

1Cloud does not include connectivity or security, both of which are sold separately.

This document does not include details on Virtual1's connectivity or security options, since it deals solely with the 1Cloud product. For more information please refer to the relevant connectivity and firewall technical descriptions.

## 1.2 What does a VDC Solution include?

1Cloud is made up of key components and a series of add-on options that may or may not be incorporated, per the needs of the customer.

Key components:

- Underlying infrastructure
- Enterprise
    - Data Centre
        - Appliance
            - Layer (optional)
                - Virtual Machines

Options:

- Backups

In addition, the VDC solution will need to incorporate connectivity so that it can be accessed from the customer's premises and via the Internet. VDC is usually sold alongside an MPLS or Internet service; sufficient bandwidth must be purchased between the VDC and the network in question. However, the VDC does not need a router as the environment exists close to the core of the network.

It is possible to run multiple VLANs if required. See the section on Networking below for more details.

Virtual1 will honour any QoS that is marked by the customer's applications but will not perform any classification or marking at the network port.

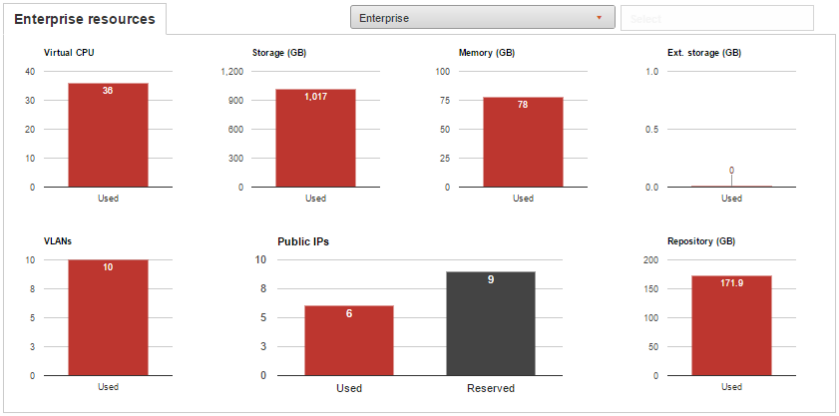
# 2. KEY COMPONENTS

**Underlying Infrastructure:** This describes the hardware platform on which the Virtual Data Centre itself is hosted. There are two geographical locations, each with an identical architecture:

- Built on a clustered set of HP blade servers running VMWare
- Connected to EMC VNX storage
- Managed using the Abiquo orchestration system
- Housed within our state-of-the-art, Tier 3 Data Centres in Docklands and Heathrow.

There is a third Data Centre location in Woking housing the backup platform the two primary VDCs will send any backup data to. See the section on Backup for more information.

**Enterprise:** A VDC Enterprise is the top-level container the End Customer sees and the object we record in Salesforce. It is the point at which the Partner and End Customer have their security defined and where attributes defining the sold service are configured.




Partners can then build Virtual Data Centres within their Enterprise.

Building two Data Centres, one at Heathrow and the other in Docklands allows the customer to build a resilient solution using tools they have within their own software or operating system, without direct involvement or support from Virtual1.

The Enterprise is the highest container level within the system. Each VDC customer will have an Enterprise built, partners also have access to all their customers Enterprises. End customers are restricted to their own Enterprise only.

The creation of a new VDC should ensure:

- the usual commercial checks are undertaken

- to enable the configuration of any “External VLANs”
- assignment of any public IP addresses

**Virtual Data Centre (VDC):** Best described as the shell: a private, dedicated and highly secure environment in which customers’ virtual servers, backup and storage are located. A VDC consumes resources:

- CPU : counted in multiples of 1
- Memory : referred to as RAM (counted in Gigabytes (GB) – big “B”)
- Disk : counted in Gigabytes (GB)– big “B”)

**Virtual Appliance (VApp):** A Virtual Appliance is a container for a number of Virtual Machines. It is in effect a grouping purely for administrative use. The Virtual Machines inside the appliance are independent of each other but you can start the VApp and all the related Virtual Machines will be started at the same time. A customer could simply have a single appliance and sit all their VMs inside it. This is expected to be the most common deployment.

**Layer:** An optional container within a VApp. When used, up to four machines can be placed in the layer and the underlying infrastructure endeavours to ensure that each is hosted on a separate physical host.

**Virtual Machines (VMs):** The name given to virtual servers, a piece of software hosted on a high-performance, clustered farm of physical servers. A VM behaves in the same way as a hardware server does but has advantages over their physical counterparts, including the fact that it is quicker, easier and cheaper to build and manage.

Each Virtual Machine consists of:

- **Virtual CPU Core**- This is the basic processing power that is utilised by VMs to perform computing tasks. The underlying virtualisation technologies allow for the abstraction of a physical processor in a manner that allows it to be utilised by many virtual machines. Each core is equivalent to a 2GHz processor.
    - Max number of virtual CPUs:8
- **Memory** – RAM (Random Access Memory) provides short term storage required to be accessed quickly by the OS and application programs
    - Up to 64GB memory
- **Disk** – provides a large amount of storage space
    - Disk space is available up to 2TB
    - Disks are auto-tiered
- **Operating System** – This should be chosen based on the applications that are required to run on the server. The four most common platforms we provide are:
    - Windows 2008 R2 Standard (64-bit)

- Windows 2012 R2 Standard (64-bit)
- Centos (64-bit)
- Ubuntu (64-bit)

The Operating system installation is defined in a template which Virtual1 provide. A new VM is built from the template and uses licence keys provided by Virtual1.

A customer may have multiple VMs, with different capabilities, within one VDC.

## 2.1 Licensing

The license cost for the operating system, (Windows or Linux) is included in the price of the CPU. Virtual1 does not provide licences or support for Applications such as: Exchange, SQL Server, and Oracle.

## 2.2 Billing

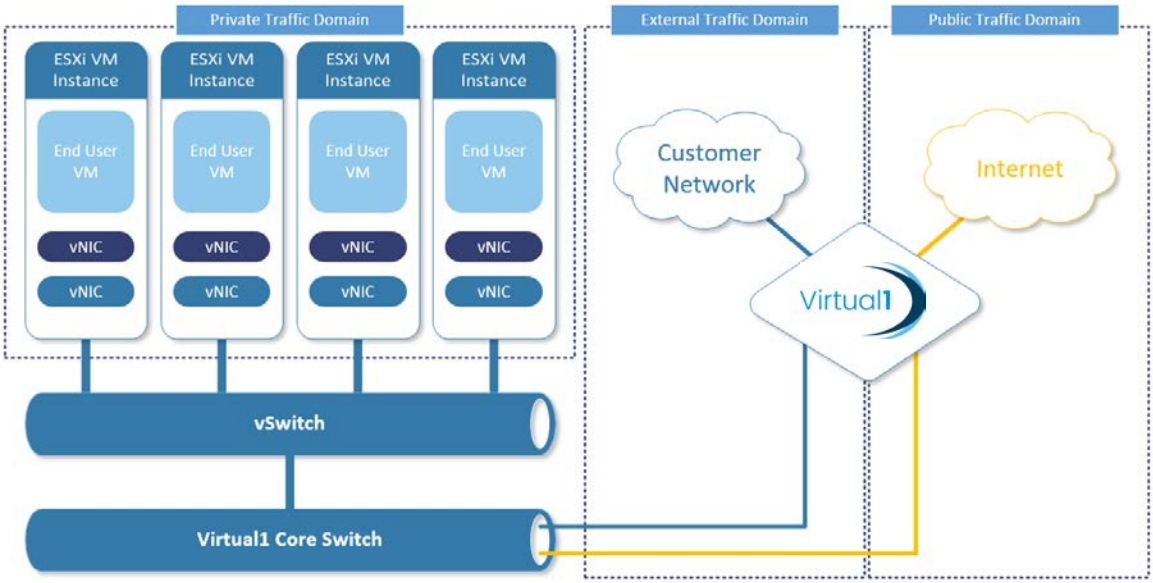
Partners are charged against Virtual1's standard cost model for the resources they use within the month.

Partners can see their current usage within the Service Inventory page in 1Portal.

## 2.3 Networking

Each Virtual Data Centre has three types of network connection:

- Private – traffic stays within the Virtual Data Centre
- Public – Internet traffic (unfiltered, un-firewalled)
- External – VLANs we take outside of the platform.



External VLANs are useful for connecting to other Virtual Data Centres (for example to get traffic between Heathrow and Docklands), to connect into an existing MPLS or VPLS network or to connect to the “clean” side of one of our physical firewall products. External VLANs are defined at Enterprise level and tied to a physical Data Centre.

Public VLANs are useful when the End Customer wants to deploy a firewall as a Virtual Machine and run it themselves. Public is one big shared IA access used by all VDC customers and should be considered an **insecure** network.

Private VLANs will always use RFC1918 addressing (for IPv4) and can have addresses automatically assigned to servers using DHCP if required, though that is unlikely to be a common deployment method.

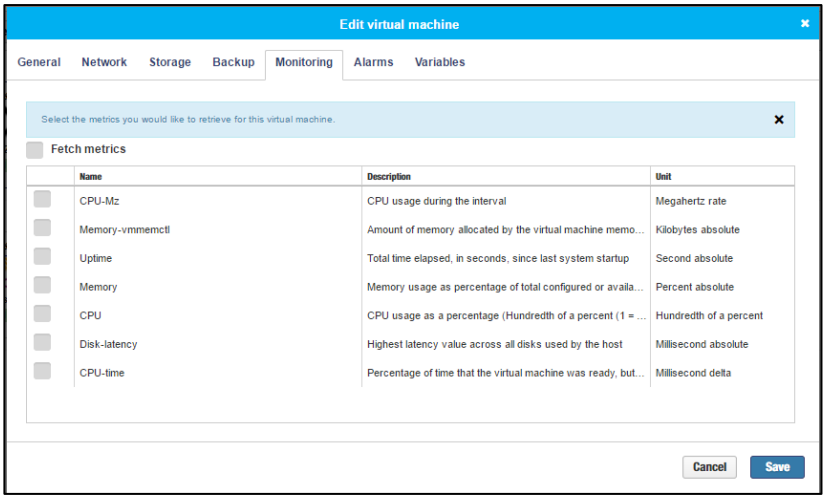
## 2.4 Firewalls

The End Customer has two distinct choices for adding firewalls to their solution:

- Use an external Dedicated or Shared Firewall product
- Build one using a VM between the **public VLAN** and the **private** or **external.**

## 2.5 Monitoring

Partners can monitor the VApp and all the VMs contained within it and gather metrics on many different elements:



The resultant graphs are visible within the web interface. Instead, the metrics can be viewed for a single VM using the monitoring symbol on the virtual machine icon:

Monitoring for an entire VApp can be seen using the “Monitoring“ tab in the top-right of the VApp screen

## 2.6 Contention

For the product to be commercially viable whilst at the same time making use of the Virtualisation technology to tap underutilised resources, Virtual1 use a principle of contention - sharing a physical resource amongst multiple logical ones. The resource management within VMWare ensures a fair sharing principle between the different demands to avoid any performance hit. Importantly Virtual1 adhere to the recommendations set by VMWare.

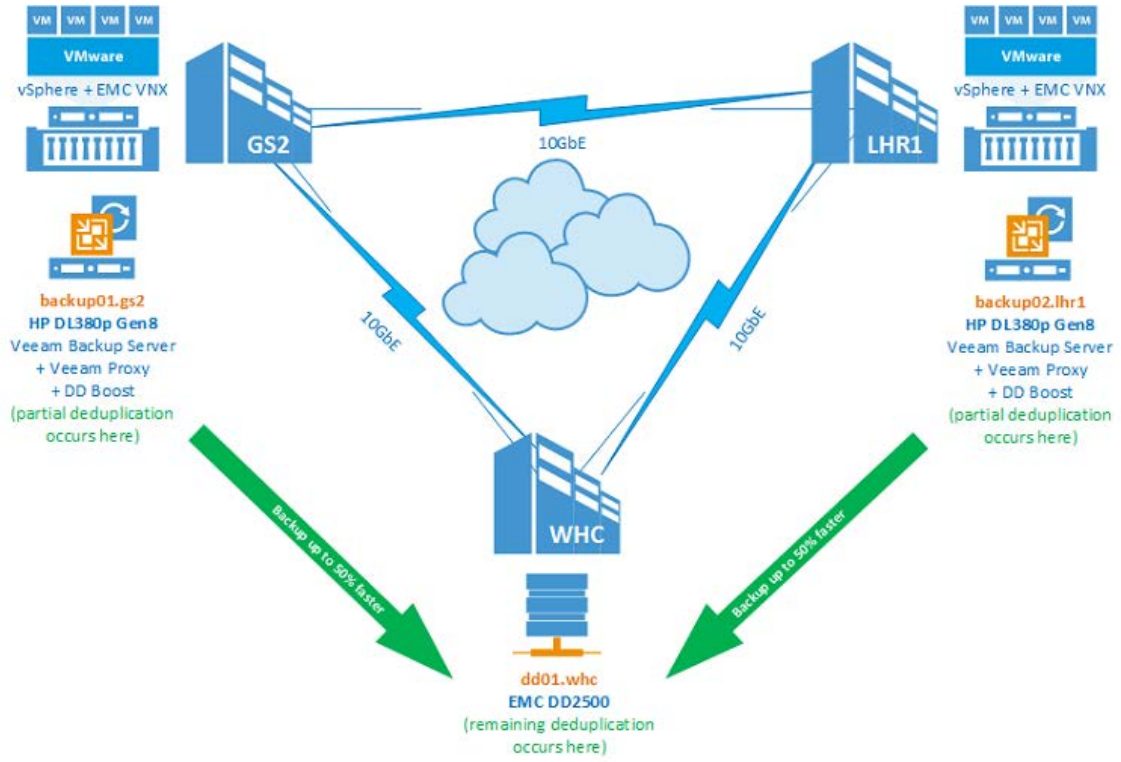
The **maximum** contention we allow the platform to get to is as follows:

| Resource | Maximum Contention |
|---|---|
| CPU | 1:4 |
| Memory | 1:1.2 |
| Disk | 1:1.5 |

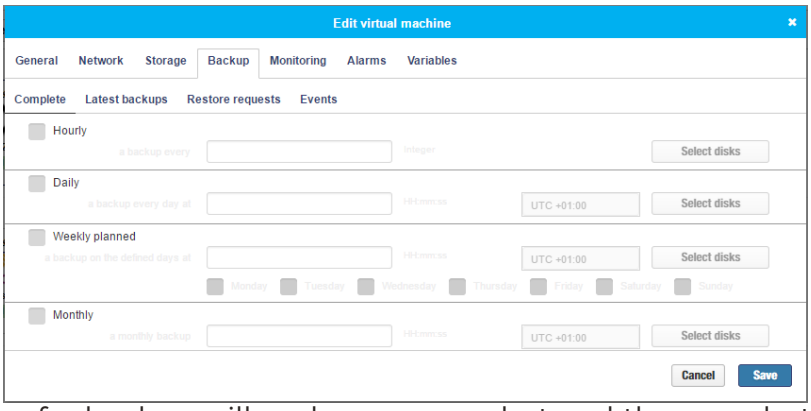
## 2.7 Backup & Restore

By default, VMs are **not backed up**. Partners need to enable backup on each VM they want to protect in this way. Each backup uses storage resource in our third Data Centre in Woking.

Backups from within Heathrow or Docklands are stored off-site in Woking on separate infrastructure. It is possible to back up from one Data Centre and restore to another and in doing so to migrate a server or just to create a replica of a VM at the other Data Centre. This is a manual task that requires Virtual1 to carry out.




The End Customer simply chooses from one of the fixed backup schedules and their VM is added to it. Virtual1 do not currently support anything other than a full VM backup, so individual applications should provide a mechanism to commit any live data to disk prior to the backup job running.




Servers electing for backup will undergo a snapshot and the snapshot compressed and backed-up at the Woking site. A full backup is taken weekly, an incremental daily. Backups are kept for 7 days.

The status of a backup job can be reviewed at the VM level and a restore performed from any backups that were successful. Partners are responsible for ensuring the correct data is being successfully backed up by performing any test restores required.

## 2.8 Data Centre Resilience

1Cloud runs within two physical, geographically separated, tier3 data centres. Each architecture uses multiple resilient components such as dual power, multiple fan trays, multiple blade servers etc.

Failure of a physical blade should be predicted by the on-board Insight Manager and VMs will be migrated away seamlessly to other hardware, ready for the failing hardware to be replaced.

If a blade was to fail before such a migration could take place, Virtual Machines will be immediately restarted on other blades. This is equivalent to a power interruption (reset button) on a physical server, but with much faster boot times.

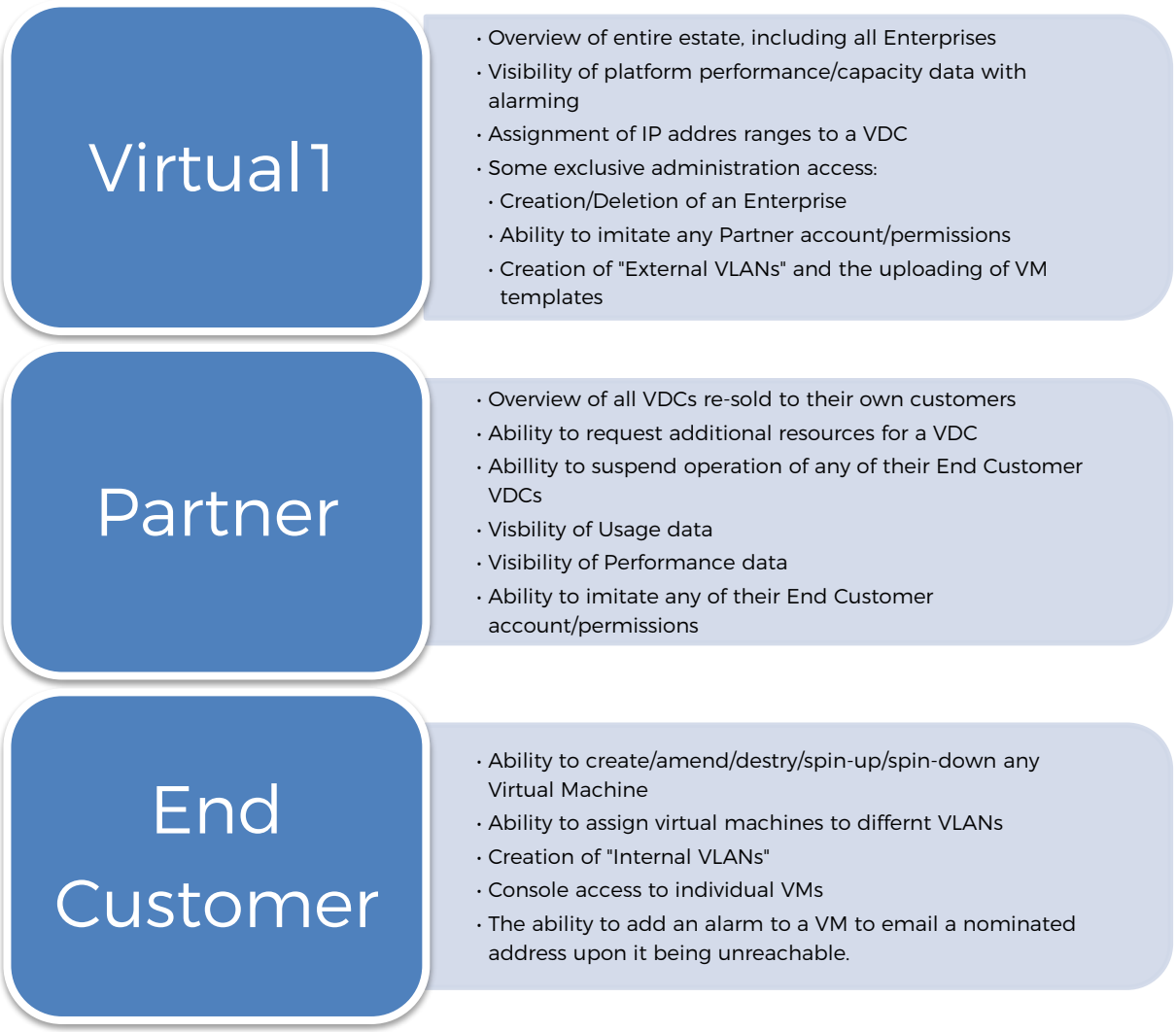
Partners and/or End Customers should replicate any data or services they require between the two data centres by spinning-up sufficient virtual machines and software to provide the resilience they require.

One example would be for a partner to build two virtual machines, one per datacentre and to run a software clustering layer, such as Microsoft Cluster Services on both machines to provide one continuous uptime logical device. Virtual1 will not do this for the customer but simply provide the capability to deploy virtual machines in two distinct locations, joined by a common layer-2 network.

## 2.9 Access Rights / Security

Virtual1 Partners order a VDC Enterprise, which provides the opportunity to have multiple Data Centres and virtual machines. There is usually one Enterprise per End Customer.

A cloud username and password will be given to the Partner which allows for them to administer enterprises for any of their end customers. Virtual1 will also create a username and password for the end customer allowing them access solely to their designated VDC enterprise.




# 3. STORAGE

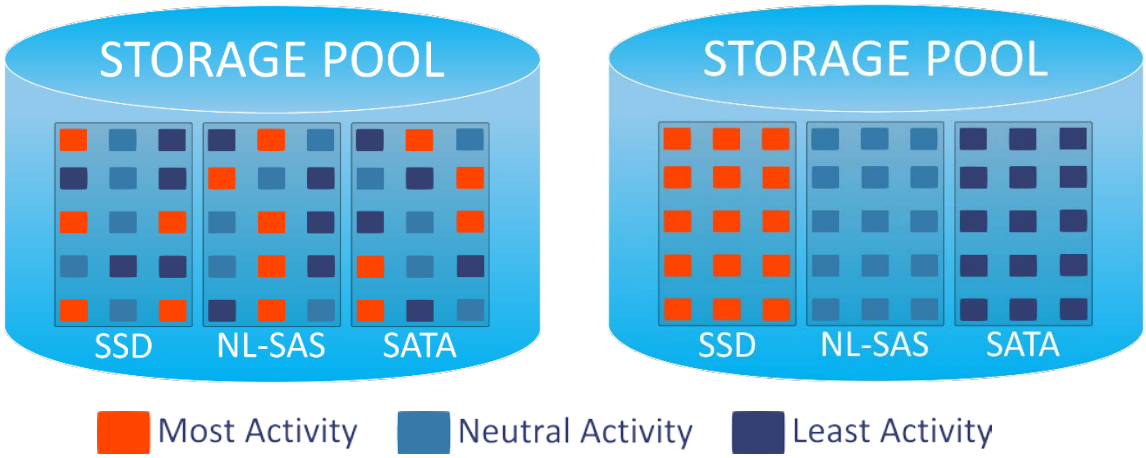
Storage is provided in each location by a local EMC VNX storage array, connected to the server farm using fibre channel switches.

Virtual1 utilise a function called “Fast VP Auto-tiering”. Every 24 hours, the array scans the various data blocks it holds and rates them based on how often they incur reads and writes. The most active blocks are moved into fast SSD flash storage. The blocks that have not been, or hardly ever been touched are moved to the slowest disk in the platform, with everything else in between.

The three disk tiers are as follows:

- Extreme Performance – SSD Flash drives
- Performance – Serial Attached SCSI (SAS)
- Capacity – Near line SAS (NL-SAS)

*Each day, the storage is audited and the slices rearranged to make optimal use of the disk performance:*




This may mean that a customer might experience slightly higher latency when recovering a file that hasn't been opened in weeks but a file opened daily will respond rapidly.

Virtual1 do not provide a facility for partners to demand their servers or applications sit on higher or lower performance hardware and instead provide an affordable fixed price for disk that adapts performance to the load placed upon it.

Partners wanting more details on this auto-tiering feature can read about it here: *https://www.emc.com/collateral/white-papers/h12102-vnx-fast-vp-wp.pdf*

# 4. FURTHER READING

| Document | Description |
|---|---|
| Product data sheet | Overview of the features and benefits, to be used as a general introduction to the product. Low level technical. |
| Sales Training PowerPoint | High level overview presentation of the product, may for the basis of a more in depth presentation. Includes diagrams and key technical information |
| Quick Start User Guide | A detailed guide listing configuration details, how to administer, how to raise change requests and how to monitor health |
| SLAs | Detailed SLA document covering all VDC products |
| Virtual1 Data Centres Guide | Information about the Virtual1 Data Centres, where the VDC will be hosted. |
| Partner Sales Toolkit | A reference point for Partners to market 1Cloud. |
| A5 Flyer | Sales promotional flyer. |