



Shared IT Services for Higher Education & Research

Conference 2017



EduCloud Workshop

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Agenda

EduCloud Server 2.0

Backup as a Service

Self-Service Restores

vCloud Director 8.20

Best Practices



Shared IT Services for Higher Education & Research

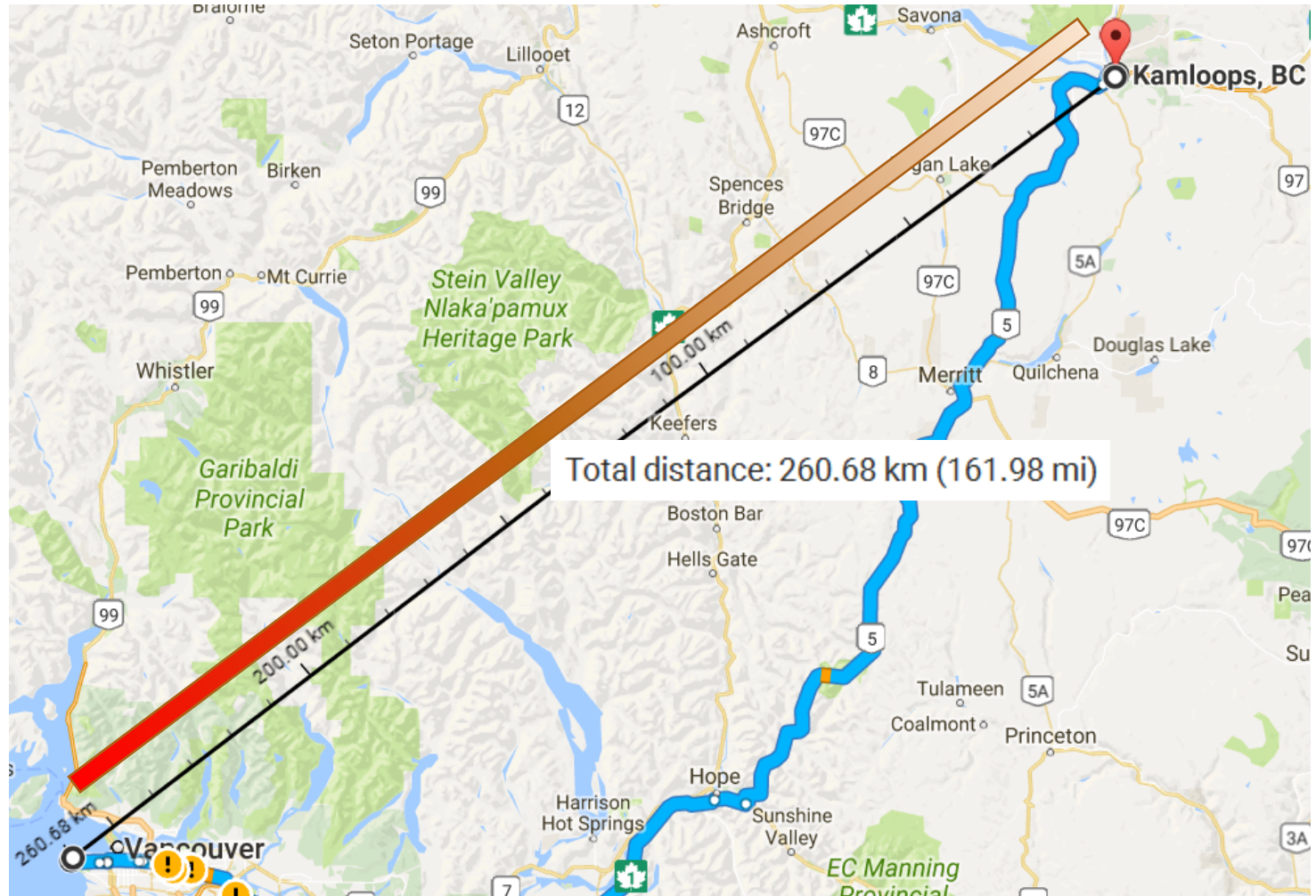
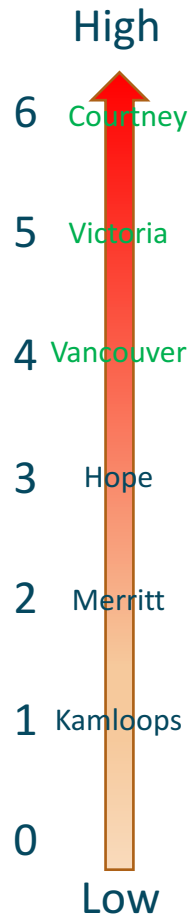
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EduCloud Server 2.0

Two Sites: Vancouver(Van), Kamloops (Kam)

Quake Hazard




Multiple Compute Performance Tiers

- Higher performance compute tier available in Kamloops
- For application components that require higher clock speeds and dedicated resources to achieve desired application performance
 - **Std** – Standard Performance – 2.2.GHz
 - **High** – High Performance – 3.2 GHz
- Abbreviations (in bold) appear in tier specific resource names (e.g. VDCs)

New StorageTiers

Three storage tiers available in Kamloops

- **Standard(\$\$)** - Lower performance guarantee/cost
 - **High(\$\$\$)**
 - **Extreme(\$\$\$\$)** - Higher performance guarantee/cost
- 

All tiers have local and remote backup.

Similar tiers will be made available in Vancouver in FY2017Q1. Older storage tiers will be deprecated/phased out as they reach EOL.

Client Subnet Routing

- Members allocate own public IP (/24 or larger) for use within EduCloud
- Subnet routed to your EduCloud Organization edge gateway
- Divide into smaller subnets for the purpose of:
 - Assigning public IP's via NAT
 - Routing directly to an organization network behind your edge gateway (servers assigned public IP).
- Caveats: Kamloops Only! POC phase. Member institution must be on BCNet Advanced Network.
- Looking for 1 or 2 members to participate in POC

Mapping Resources into your Org

Each site + compute tier is mapped into your organization as a separate virtual datacenter.

Currently 3 possible VDCs:

- **<org>-Van-Std** Vancouver Standard Perf
- **<org>-Kam-Std** Kamloops Standard Perf
- **<org>-Kam-High** Kamloops High Perf

Networking

- Networking at EduCloud sites is independent:
 - Kamloops – via Kamloops city hall (KAMTX)
 - Vancouver – via Harbour Centre (VANTX).
- Transit exchange is independent.
- Private IP space is independent – no routing of private IP between sites at infrastructure layer.

Multiple Edge Gateways

- Each site requires an edge gateway to manage:
 - Routing
 - Firewall
 - NAT
 - Load Balancing
- Organizations utilizing resources at both sites will have 2 edge gateways
- Each edge gateway will have a different pool of public IP allocated to it.

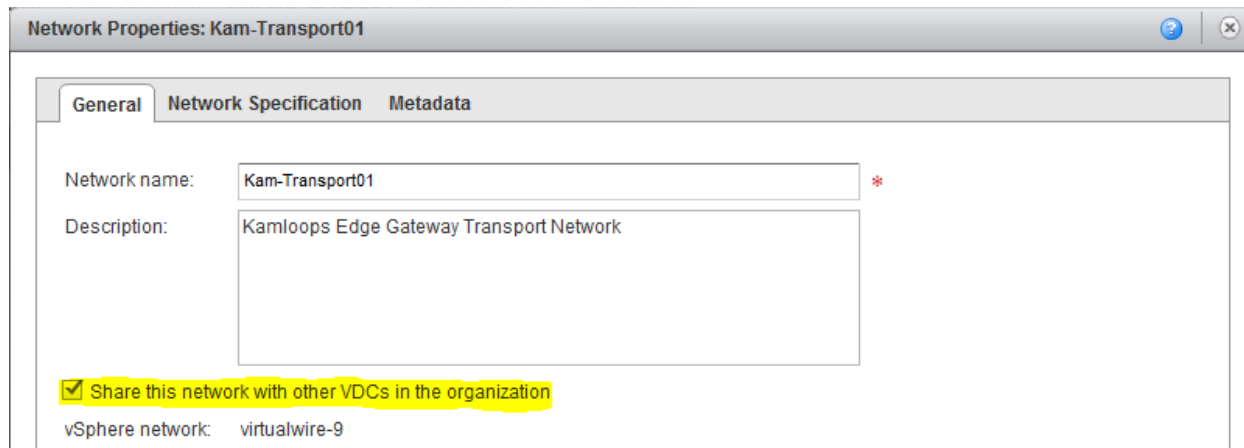
Inter-Site Communications

- Communications between sites is through edge gateways and BCNet Advanced Network.
- For servers to communicate between sites:
 - Provide public IP (via NAT or other means).
 - Set up site-to-site IPSec VPN to allow secure direct routing of private IP between sites.
- Avoid overlapping IP for Org VDC networks
- Org VDC IP assignment strategy:
 - 192.168.0.0/20 – Vancouver
 - 192.168.16.0/20 – Kamloops

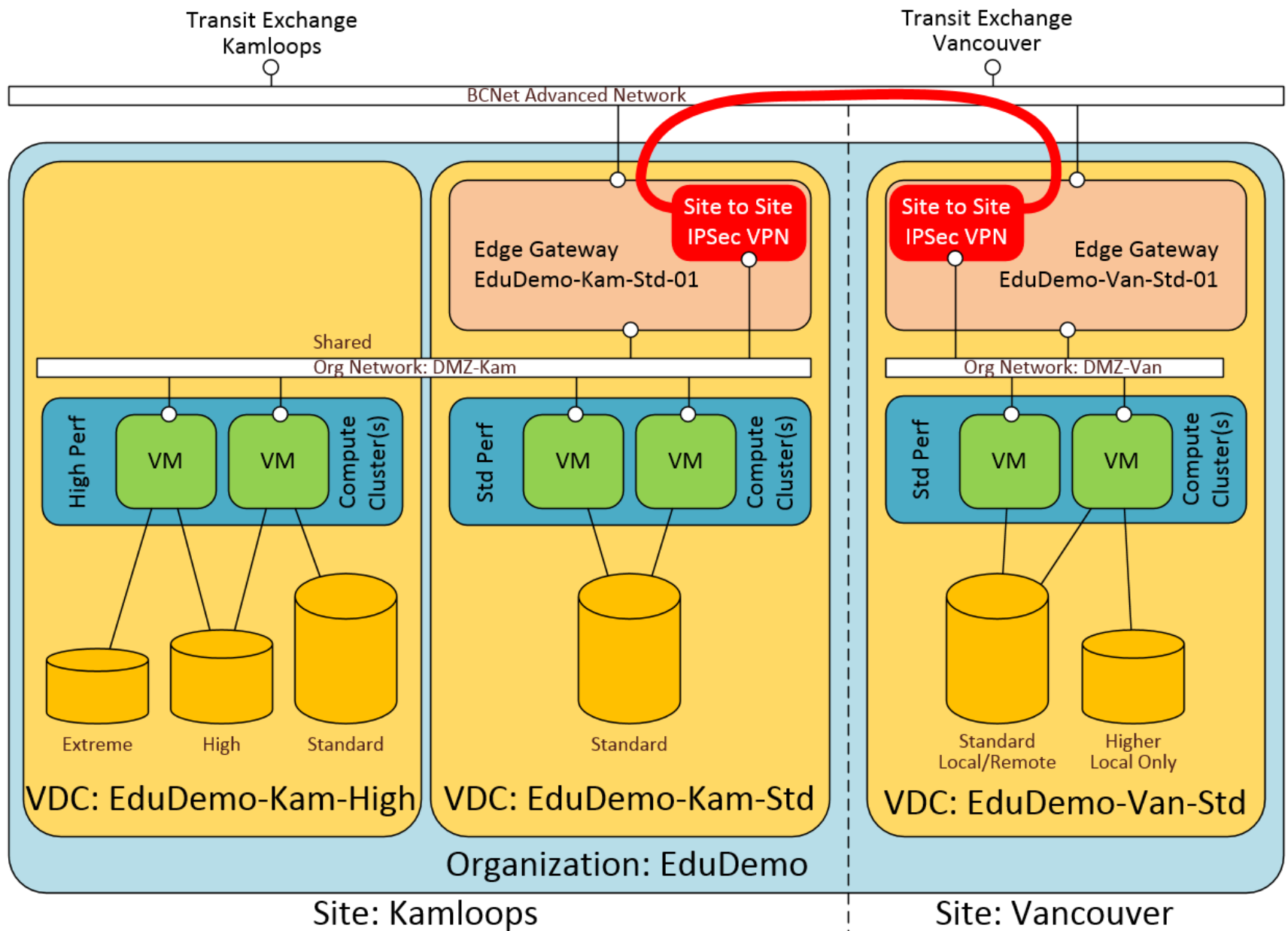
Multiple Site VDCs & Shared Networks

If you have multiple VDCs at the same site:

- Check “Share this network with other VDCs in the Organization” when creating org networks.



- Allows management of all networks via single site edge gateway



Set Up Intra-Org VPN

To set up VPN between your organization sites:

- Ensure firewall, static routing, and VPN is enabled on Edge Gateways to be peered
- Select the “VPN” service tab and add a config:
 - Add a “Name” and “Description”
 - Ensure “Enable this VPN configuration” is checked
 - Establish VPN to “A network in this organization”
 - Select the edge gateway you wish to peer with
 - Select the local and remote networks to peer
 - Save the config

Set Up Intra-Org VPN - continued

Allow up to 10 mins for status to go green on both edge gateways that were peered.

The edge gateway being configured, and the peer are both configured.

Set up firewall rules on both edge gateways to permit appropriate traffic between the peered networks.

You will be unable to peer if there are any org networks with overlapping IP space.

Set Up Intra-Org VPN - continued

Add a Site-to-Site VPN configuration

Name:

van-kam-private *

Description:

Peer all private network between Vancouver and Kamloops

☒ Enable this VPN configuration

Establish VPN to:

a network in this organization ▾

Local & Peer Networks

Peer Edge Gateway:

EduDemo-Van-Std-01 ▾

Local Networks:

Kam-Transport01 (192.168.16.0/24)

Peer Networks:

Van-Transport01 (192.168.1.0/24)

VPN connection settings

Local Endpoint:

Q9DC-GATEWAY1 ▾

☐ Use Public IP

Peer Endpoint:

BCNet Uplink-p02 ▾

☐ Use Public IP

Encryption protocol:

AES256 ▾

Shared Key:

The shared secret must be an alphanumeric string between 32 and 128 characters in length. It must include at least one uppercase letter, one lowercase letter, and one number.

OK

Cancel

[illegible]

Selecting Virtual Datacenters

When deploying, copying, or moving vApps, be sure to review and select correct VDC

Default VDC can change when VDCs are added or removed (alphabetical order – first selected)

A list of available VDC's, with description, is displayed when the Virtual Datacenter drop down list is opened

Add vApp from Catalog

Select vApp Template

Select Name and Location

Configure Resources

Configure Networking

Customize Hardware

Ready to Complete

Select Name and Location

A vApp is a cloud computer system that contains one or more virtual machines. Describe this vApp and select its Virtual Datacenter.

Name:

Description:

Virtual Datacenter

Select the Virtual Datacenter (VDC) in which this vApp is stored and runs when it is started.

All

Name	Description	Allocation Model	Hardware Version
EduDemo-Kam-Hi...	Kamloops High Performance Compute Tier	Allocation Pool	10
EduDemo-Kam-Std	Kamloops Standard Performance Compute Tier	Allocation Pool	10
EduDemo-Van-Std	Vancouver Standard Performance Compute Tier	Allocation Pool	10

1-3 of 3

Finish

Cancel

Selecting Catalog Images

When deploying a vApp or VM – select image located at same site as the vApp or VM

Benefits:

- Deployment is much faster and efficient – taking a few minutes vs 30+ minutes
- EduCloud public catalogs contain images optimized for the infrastructure at that site.

Public Catalogs:

- EduAdmin-Kam – Kamloops Catalog
- EduAdmin-Van – Vancouver Catalog

Selecting Catalog Images

Add vApp from Catalog

Select vApp Template

Select Name and Location

Configure Resources

Select vApp Template

A vApp is a cloud computer system that contains one or more virtual machines (VMs). Select a pre-built vApp template from the catalog for your new vApp.

i Need access to a different vApp? Contact your administrator to get access to more vApps.

Look in: Public Catalogs

Gold Masters All Templates

All

Name	Catalog	VDC	Owner
Red Hat Enterprise Linux 6 64bit	EduAdmin-Kam	EduAdmin-Kam-Std	system
Red Hat Enterprise Linux 6 64bit	EduAdmin-Van	EduAdmin-Van-Std	system
Red Hat Enterprise Linux 7 64bit	EduAdmin-Kam	EduAdmin-Kam-Std	system
Red Hat Enterprise Linux 7 64bit	EduAdmin-Van	EduAdmin-Van-Std	system
Ubuntu 14.04 LTS 64bit	EduAdmin-Kam	EduAdmin-Kam-Std	system
Ubuntu 14.04 LTS 64bit	EduAdmin-Van	EduAdmin-Van-Std	system
Ubuntu 16.04 LTS 64bit	EduAdmin-Van	EduAdmin-Van-Std	system
Ubuntu 16.04 LTS 64bit	EduAdmin-Kam	EduAdmin-Kam-Std	system

1-15 of 15

Remaining Stored VM quota: Unlimited

Maintaining Multiple Catalogs

Recommend maintaining copies of catalogs at both sites (if deployed with any frequency)

Two options:

- Independently manage/maintain images at both sites and publish to catalog at same site
- Maintain images at one site, but synchronize catalog to other site using publish/subscribe

Publish/Subscribe must be activated for your org

Catalog→Publish/Subscribe Settings...

Include site in your catalog name. Be sure to select storage located at proper site!

Publish/Subscribe - Publishing

Catalog Properties: EduAdmin-Van

General Sharing Storage **External Publishing** Metadata

☒ Enable Publishing

<https://bcnet.educloud.ubc.ca/vcsp/lib/2e74b2be-7da1-46e4-806c-b1d2dd7215dc/> Copy Link

Password:

Supply an optional password to access the catalog. Only ASCII characters are allowed in a valid password.

Confirm Password:

☐ Enable early catalog export to optimize synchronization.
If this option is selected, extra storage is required to store the published catalogs at the transfer server storage location.

☐ Preserve identity information
Include BIOS UUIDs and MAC addresses in the downloaded OVF package. This limits portability of the package and should only be used when necessary.

Publish/Subscribe - Subscribing

Catalog Properties: EduAdmin-Kel

General Sharing Storage **Catalog Subscriptions** Metadata

Subscribed Catalog

Update the location URL and the password for this subscribed catalog.

Subscription URL
Example: <https://www.example.com/catalogs/my-catalog/>
or <file:///data/catalogs/my-catalog/>

Password:
Supply an optional password to access the catalog.

☒ Automatically download the content from external catalog.

Publish/Subscribe - Subscribing

The screenshot shows a 'New Catalog' wizard window. On the left is a sidebar with four buttons: 'Name this Catalog' (highlighted in blue), 'Add Storage', 'Share this Catalog', and 'Ready to Complete'. The main area is titled 'Name this Catalog' and contains a description: 'A catalog allows you to share vApp templates and media with other users in your organization. You can also have a private catalog for vApp templates and media that you frequently use.' Below this are input fields for 'Name' (with a red asterisk) and 'Description'. A section titled 'Subscribed Catalog' follows, with a description: 'Subscribed catalog is a read-only copy of an external published catalog and cannot be modified. Check the box and provide the location URL and an optional password.' There are two checkboxes: 'Subscribe to an external catalog' (checked) and 'Automatically download the content from external catalog.' (checked). Below the first checkbox is a 'Subscription URL' field (with a red asterisk) and an example: 'Example: https://www.example.com/catalogs/my-catalog/ or file:///data/catalogs/my-catalog/'. Below that is a 'Password' field with the instruction 'Supply an optional password to access the catalog.' At the bottom right are four buttons: 'Back', 'Next' (highlighted in blue), 'Finish', and 'Cancel'.

New Catalog

Name this Catalog

A catalog allows you to share vApp templates and media with other users in your organization. You can also have a private catalog for vApp templates and media that you frequently use.

Name *

Description

Subscribed Catalog

Subscribed catalog is a read-only copy of an external published catalog and cannot be modified. Check the box and provide the location URL and an optional password.

☒ Subscribe to an external catalog

Subscription URL *

Example: <https://www.example.com/catalogs/my-catalog/>
or file:///data/catalogs/my-catalog/

Password:

Supply an optional password to access the catalog.

☒ Automatically download the content from external catalog.

Back Next Finish Cancel

Publish/Subscribe - Subscribing

New Catalog

Name this Catalog

Add Storage

Share this Catalog

Ready to Complete

Select Storage Type

☐ Use any storage available in the organization

Choose this option if you do not need to store catalog items on a specific storage.

☒ Pre-provision on specific storage policy

Choose this option if you want to store catalog items on a specific VDC storage policy.

- vApp templates in this catalog will be fast provisioned on selected VDC storage policy.
- Instantiating a vApp from fast provisioned vApp template is faster.
- A VDC storage policy selected will cause the vApp template size to count against your catalog storage quota.

Development Standard Performance Local Snapshot

Storage Policy	Organization VDC
Development Standard Performance Local Snapshot	EduAdmin-Van-Dev
EDUADMIN Standard Performance Local and Remote	EduAdmin-Van-Std
ESXOK01 Higher Performance Local and Remote	EduAdmin-Kel-Std
ESXOK01 Higher Performance Local Backup Or	EduAdmin-Kel-Std
ESXOK01 Standard Performance Local and Remote	EduAdmin-Kel-Std
ESXOK01 Standard Performance Local Backup	EduAdmin-Kel-Std
GROUP01 Standard Performance Local Backup	EduAdmin-Van-Std
High SAS (\$\$\$)	EduAdmin-Van-Std
Standard SATA (\$\$)	EduAdmin-Van-Std
Standard(\$\$)	EduAdmin-Kam-Std

1-10 of 10

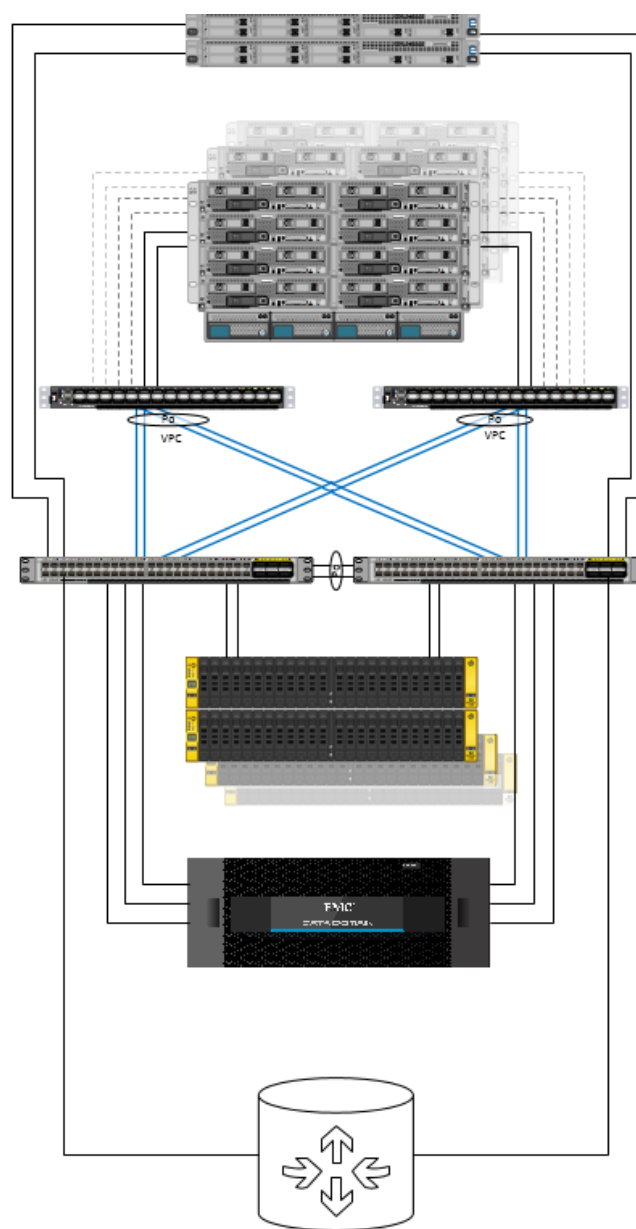
Miscellaneous

vApps cannot span VDCs

vSphere:

- Maximum hardware level - 10
- Enhanced vMotion Compatibility level – maintain at “Sandy Bridge”

Hardware and EVC levels will be raised following hardware refresh in Vancouver



Bootstrap/Backup Servers
2 x C220 M4 Servers (24 core, 128GB)

Virtualization Hosts
5108 Chassis
2 x 2208XP I/O Modules
8 x B200M4 Blades (24 core, 512GB)

Fabric Interconnect Layer
Cisco UCS 6248UP FI Pair

Access Layer
Cisco 93180YC-EX Switch Pair

Storage Layer
HP 3PAR StoreServ 8450

Backup Storage Layer
DD9500 + DS60 Storage Shelves

BCNet
Q9 Router

Requesting Resources

New:

- Review Service Catalog – Sites, Compute, Storage
- Specify Site(s) you need to deploy services at.
- For each site, specify compute tiers you require, and CPU (GHz) and Memory (GB) to be allocated
- For each Site + Compute tier, specify storage tiers required, and amount of each tier to allocate.

Changes:

- Specify by VDC, which resources need to be increased, decreased, added or removed.



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Backup as a Service

Overview

- Backup as a target
- Integrates into your current backup infrastructure
- Easy setup
- Remote/off-site
- Secure Multi-Tenancy
- Locations
 - Kamloops – Available now
 - Vancouver – FY2017Q3

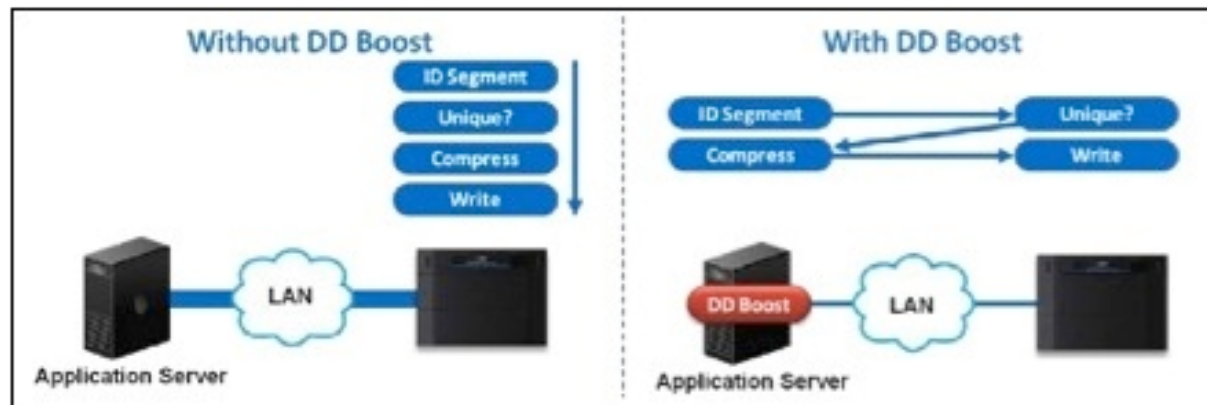


Minimum Requirements

- Must be a part of the BCNet Advanced Network
- Your backup software version must be on the compatibility list

Supported Protocols

- EMC's DDBoost (preferred)
 - Server side Deduplication
 - Reduced Bandwidth
 - Best Compression



- NFS

Maintenance Schedule

- Maintenance windows
 - Minor upgrades and maintenance – first Saturday of each month
 - Major upgrades and maintenance – twice per year in July and December
- Continued compatibility required
 - Backup software must be updated to remain on the compatibility list.
 - Any changes in compatibility will be communicated ahead of time

Common Questions

- Manage your own schedules, data retention, integrity
- Encryption
- Refer to your backup product vendor documentation for best practices
- Size based on your source (Client) Data
- Daily Reporting/Trending

Responsibility matrix

	Client	Service Provider (BCNET / UBC)
Maintaining and monitoring EduCloud BaaS (target) infrastructure		X
Maintaining and monitoring the source infrastructure including maintaining the backup software	X	
Backup job schedule	X	
Data retention	X	
Data integrity	X	
Additional licensing (e.g. DD Boost)	X	
Providing daily quota reports		X
Service outage and maintenance notifications		X



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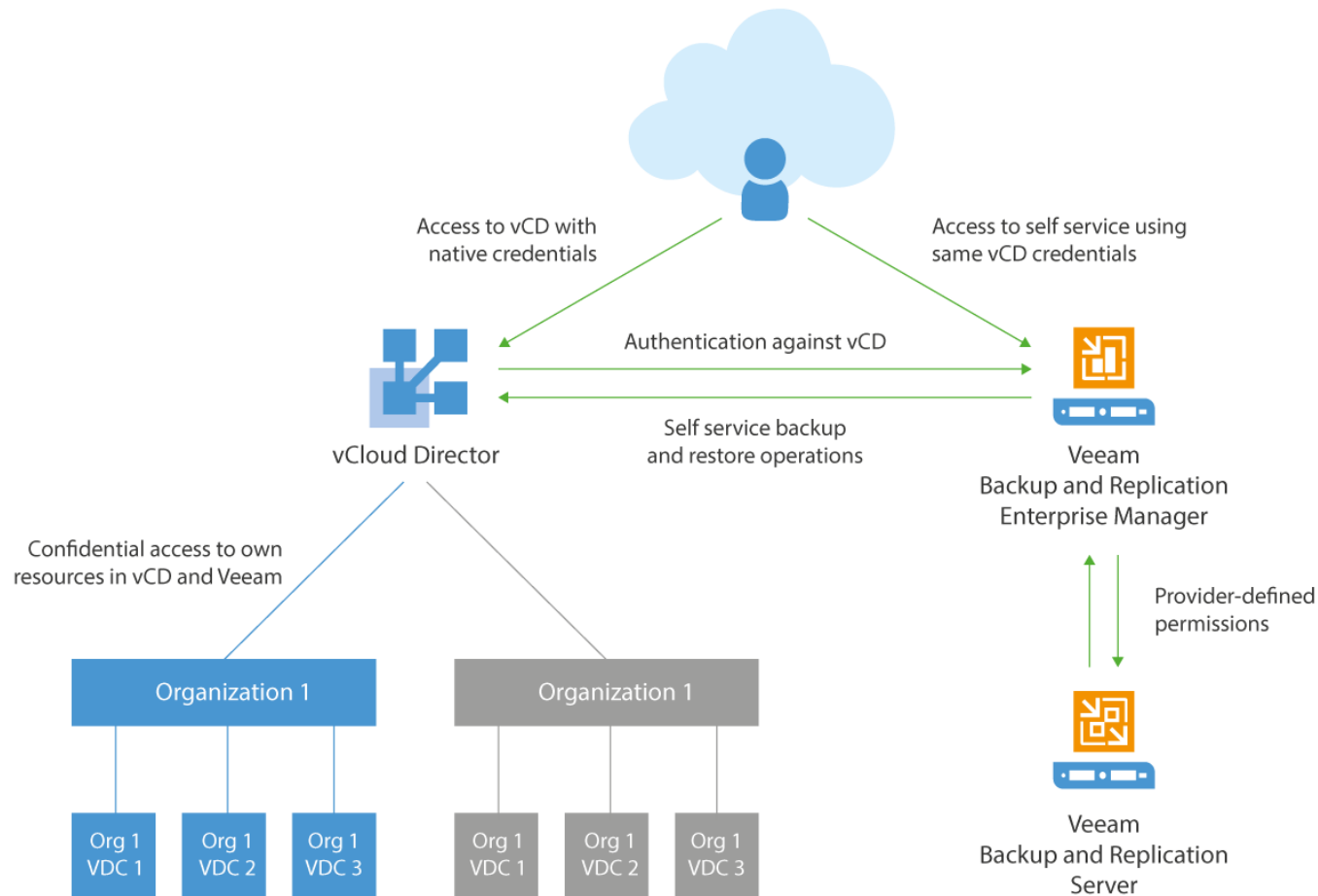


Self-Service Restores

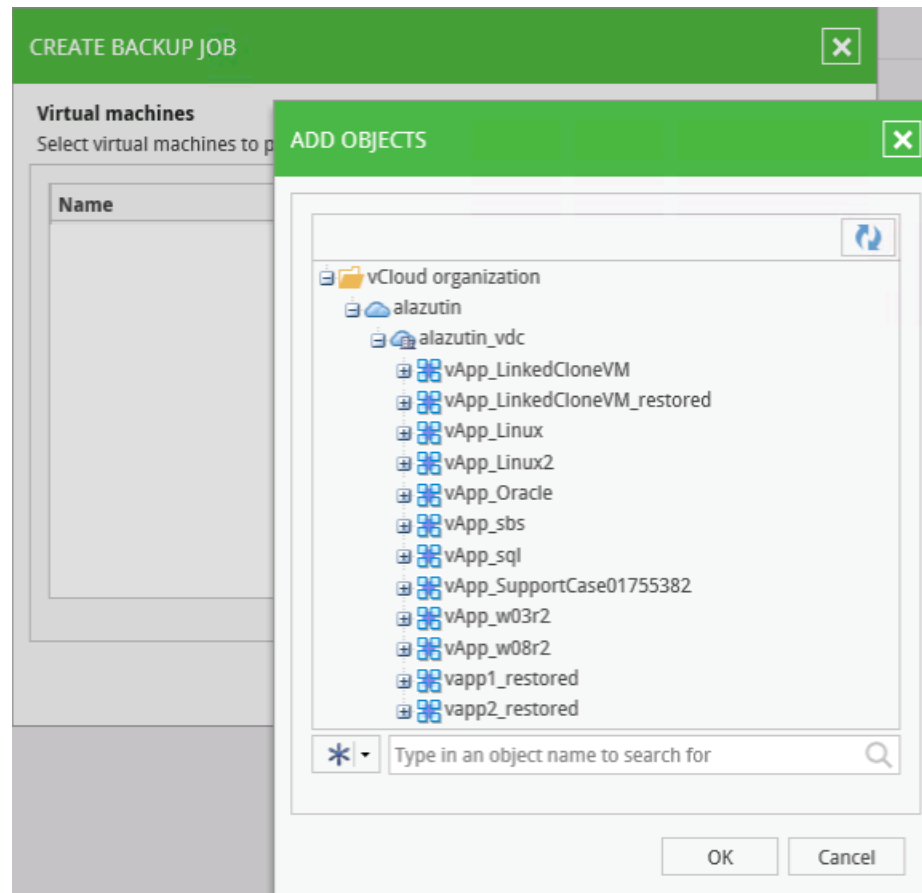
Self-Service Restores Overview

- Veeam Integration with vCloud Director
- Access all backups of your Educcloud servers
- Easy to use web interface
- Firewall rules will be required for advanced functionality
- Coming FY2017Q1

vCloud Integration



Veeam Interface



Veeam Interface - Cont.

EDIT BACKUP JOB

Guest processing
Choose additional processing options available for Microsoft Windows guests.

☒ **Enable application-aware image-processing**
Detects and prepares applications for consistent backup, performs transaction logs processing, and configures the OS to perform required application restore steps upon first boot.
Customize application handling options for individual VMs and applications Applications

☒ **Enable guest file system indexing**
Indexes guest OS files inside processed VM to enable browsing and searching for guest files in backup. Indexing is completely optional, and not required to be able to perform instant file level recovery.
Customize advanced guest file system indexing options for individual VMs Indexing

Guest OS credentials:

Credentials: qahv1\dima.ved (Created by alazutin at 5/6/2016 2:42:01) +

Customize guest OS credentials for individual VMs and operating systems Credentials

- Edit...
- Delete
- Add Windows account...
- Add Linux account...
- Add Linux private key...


< Previous Next > Cancel


Self-service Restores


Self-Service Backup Portal for alazutin

DASHBOARD | JOBS | VMS | FILES | ITEMS


SQL DATABASES

Type in SQLServer\InstanceName  or pick server ...

Database 


 AL-W08R2-SQL\VEEAMSQL2012 (al-w08r2-sql (053592e0-5dc0-46ca-b29e-c307254f3b38))


VeeamOne

 AL-W08R2-SQL2\VEEAMSQL2012 (al-w08r2-sql2 (c6515a56-2658-417a-b0cd-f1c315e49faa))

VeeamOne

▼ Pick another restore point

Restore point: 5/6/2016 01:57:09 pm 

Point in time: 

▼ Destination

☒ Restore to original location


☐ Restore to this location:

Type in SqlServer\InstanceName

Database

Restore

Restore latest available state to original location [History](#)

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Links

- Dell EMC DataDomain
 - <http://compatibilityguide.emc.com:8080/CompGuideApp/getDataDomainCompGuidePage.do>
 - <https://www.emc.com/collateral/white-papers/h11755-business-value-dd-boost-wp.pdf>
- Veeam information:
 - <https://www.veeam.com/blog/enhanced-vmware-vcloud-director-support.html>



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vCloud Director 8.20

vCloud Director 8.20: New Features

- New Web UI for NSX Integration
- Advanced Edge Gateway and Distributed Firewall Configuration
- New vCloud API for NSX
- Role Administration at the Organization Level
- ETA – FY2017Q1

New Web UI for NSX Integration

- Built on HTML5

Edge Gateway - TEST-01

Firewall DHCP NAT **Routing** Load Balancer VPN SSL VPN-Plus Certificates Grouping Objects Statistics Edge Settings

Global Configuration Static Routes OSPF BGP Route Redistribution

Routing Configuration

ECMP ☐

STATIC ROUTING DEFAULT GATEWAY

Applied On ⓘ

Gateway IP *

MTU *

Description

Advanced Edge Gateway and Distributed Firewall Configuration

- Dynamic routing
- Distributed firewall
- Tenant layer 2 (L2) VPN access
- Tenant SSL VPN
- Load balancing

Advanced Edge Gateway and Distributed Firewall Configuration

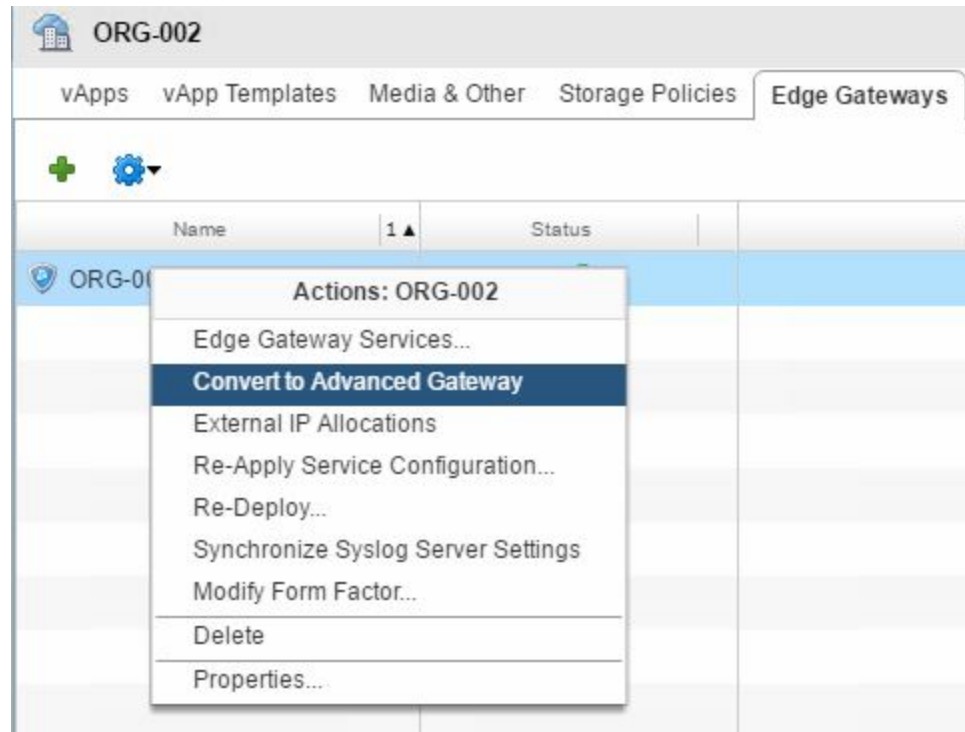


Image Credits:
Anthony Spiteri - <http://anthonyspiteri.net>

Advanced Edge Gateway and Distributed Firewall Configuration

Edge Gateway - Tenant001-OrgVDC-Edge-Dev

Firewall DHCP NAT Routing Load Balancer VPN SSL VPN-Plus Certificates Grouping Objects Statistics **Edge Settings**

Edge Settings

Syslog Server Settings

Syslog Server: None

[EDIT SYSLOG SERVER](#)

SSH Status

Enabled ☐

SSH Settings

Username *

Password *

Retype Password *

Password Expiry

in Day(s)

Login Banner

Image Credits:
William - <http://www.justavmblog.com>

Advanced Edge Gateway and Distributed Firewall Configuration

Edge Gateway - TEST-01

Firewall DHCP NAT **Routing** Load Balancer VPN SSL VPN-Plus Certificates Grouping Objects Statistics Edge Settings

Global Configuration Static Routes OSPF BGP Route Redistribution

Routing Configuration

ECMP ☐

STATIC ROUTING DEFAULT GATEWAY

Applied On NET_EXT_001

Gateway IP * 192.168.1.254

MTU * 1500

Description

DYNAMIC ROUTING CONFIGURATION

Router ID

Enable Logging Enabled ☐

Log Level Info

OSPF Disabled

BGP Disabled

Image Credits:
Anthony Spiteri - <http://anthonyspiteri.net>

Advanced Edge Gateway and Distributed Firewall Configuration

Edge Gateway - Tenant001-OrgVDC-Edge-Dev

Firewall DHCP NAT Routing Load Balancer VPN SSL VPN-Plus Certificates Grouping Objects Statistics Edge Settings

Firewall Rules

Enabled



Show only user-defined rules ☐

No.	Name	Type	Source	Destination	Service	Action
1 ✓	firewall	Internal High	vse	Any	Any	Accept
2 ✓	default rule for ingress traffic	Default Policy	Any	Any	Any	Deny ▼

Image Credits:
William - <http://www.justavmblog.com>

Role Administration at the Organization Level

- Roles are no longer global, but instead are organization specific.
- Organization administrator can create own organization specific roles from subset of granted rights.

Role Administration at the Organization Level

Role Properties: Organization Administrator

Organization: SiemaLabs *

Name: Organization Administrator *

Description: Built-in rights for administering an organization

Rights for this Role

- [-] All Rights
 - [x] Catalog
 - [x] Catalog Item
 - [x] Disk
 - [x] Distributed Firewall
 - [x] From-the-Cloud Tunnel
 - [-] Gateway
 - [x] Configure Syslog Server
 - [x] Convert to Advanced Gateway
 - [x] Configure Services
 - [] Modify Form Factor
 - [x] View Gateway
 - [x] General
 - [x] Organization VDC Network
 - [x] Organization
 - [-] Organization VDC
 - [x] Role

☐ Show only selected rights

OK Cancel

Image Credits:
Anthony Spiteri - <http://anthonyspiteri.net>



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Best Practices

How to get the best out of your EduCloud
Server environment

VM Snapshots - Benefits

Intended as short-term backout mechanism

- You can snapshot either a single VM or an entire vApp
- vCloud Director limitation still at 1 snapshot

VMware's best practices recommendation is not to keep a snapshot longer than 24-72 hours

VM Snapshots - What's the big deal?

- Performance degradation
 - Noticeable even on high/extreme performance disk tiers
 - The larger the snapshot / rate of change, the longer it takes to remove it – may cause application stun
- You cannot increase VMDK size
 - Snapshot needs to be removed first
- Increased backup times
 - Snapshot will be taken on top of the existing and the backup job reads that snapshot

VM Snapshots - Next Steps

- Implement reporting - FY2017Q1
 - Provide an easy way to know which VMs are running from snapshots
- Suggested snapshot policy
 - 2 week retention maximum
 - All snapshots will be automatically removed

VMware tools - Benefits

Enhances the performance of the VM's guest OS and improves management of the VM

- Required for guest OS customization
- Allows hot-add features to be enabled
- Required for application aware backups

Provides support for drivers

- VMXNET3 network, mouse and video drivers

All EduCloud Server templates come with VMware tools installed and running

VMware Tools - Next Steps

- Running VMware tools is a best practice in a virtualized environment
- Make updating VMWare tools a part of your regular maintenance schedule
- Implement reporting - FY2017Q1
 - Easier way to know which VMs do not have VMware tools installed / out of date
- Running VMware tools - requirement for support

Resource Rightsizing

Rightsizing is process of ensuring appropriate resources are assigned to a VM to meet demand.

Over allocating VM resources can have a negative impact on both a VM's performance and the performance, efficiency and achievable density of the underlying infrastructure.

An ongoing process done on a regular cycle.

CPU Sizing Guidelines

- To maximize host CPU utilization and efficiency, size number of CPU's just big enough to handle peak loads.
- Design applications for horizontal growth – Better 4 app servers with 2 vCPU than one app server with 8 vCPU.
- < 35% Average CPU busy – oversized.
- > 70% average CPU busy – undersized.

Memory Sizing

- Just large enough to meet application peak demands.
- Grow in smaller increments (not powers of 2!)
- Take into account guest OS memory usage information (how much application, file system buffer, etc)
- Take into account application specific sizing requirements (e.g. java stack sizes).
- “Memory Demand” metric – indicator of memory pages being actively accessed.
- Allocated and Used metrics.

Public Catalog Changes

- Windows 2012 R2
 - Windows 8/10
 - Windows 2016 (FY2017Q1)
 - RHEL 6/7
 - Ubuntu 14/16 LTS
 - Maintained on a monthly basis
-
- Windows 2008 and 2012 will be removed from the Vancouver public catalog templates on June 1

Creating your own Catalog

- Publish your own catalog to the Org
 - Be location aware
- Consult the VMware compatibility chart for supported guest OSs
- Install VMware tools as part of the template
 - Enable guest introspection for Windows
- Use VMXNET3 network drivers
 - Defaults to E1000 – needs to be changed manually
- Implement a patching cycle for templates

Current Known Issues

- Provisioning error if hardware changes are made in the first step
- Growing VMDKs past 2TB requires the VM to be powered down
- 3rd party virtual firewalls and load balancers
 - Limits our ability to support issues
- Client integration plugin

Support

- Service notification mailing list
 - Over the next few weeks we will be reaching out for a list of contacts to be notified in cases of regular maintenance or unscheduled incidents
- Support webform
<http://web.it.ubc.ca/forms/bcnet>
- Documentation
 - Service Catalogue – <https://www.bc.net>
 - BCNET wiki <https://wiki.bc.net>

Escalations

Issues can be reported via

- Support form <http://web.it.ubc.ca/forms/bcnet>
- NOC at 604-822-1348

24x7 support is available for infrastructure related incidents

- Example: your NSX edge gateway stops working

Response Times

Impact Level	Impact Description	Example	Response time
5	Critical	Service unavailable, infrastructure level issues	Within 1 hour
4	Extremely Urgent	Service available, critical virtual machines not available	Within 4 hours
3	Urgent	Service degraded	Within 1 business day
2	Medium	Individual user / VM	Within 2 business days
1	Low	Service functional, assistance required in using service or configuration	Within 3 business days

Resources

Client Integration Plugin

<https://fojta.wordpress.com/2017/03/30/client-integration-plugin-vcloud-director-and-compatible-browsers/>

Guest OS Customization Matrix

<https://partnerweb.vmware.com/programs/guestOS/guest-os-customization-matrix.pdf>