VMWare VSphere HA cluster, vMotion
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Overview

In this assignment we're going to be looking at, configuring, and demonstrating: iSCSI, vMotion, High Availability, Fault Tolerance, DRS, vSphere Replication to another vCenter, and vSphere backup.

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Setting up the iSCSI Infrastructure

Creating a zvol

Before you begin grab your **ISCSI Name** in **Hosts & Clusters** > **click on your ESXI** > **Storage** > **Storage Adapters**, if the iSCSI adapter is not there click add an adapter and make it iSCSI. Click on the iSCSI adapter and in **Properties** under **Adapter Details** click **Edit** and copy the iSCSI name to your clipboard.

Log into your FreeNAS server click the **Storage** tab at the top, click on **vSphere_Projects** and at the bottom of the page click **Create zvol**. Give it a name, an appropriate amount of storage, and leave the compression level default. Now on the side navigation bar go to **Sharing** > **Block (iSCSI)** > **Target Global Configuration** > **Initiators**. Once you are in the Initiators tab make sure you still have the iSCSI Name of the adapter copied to clipboard and click **Add Initiator** in the **Initiators** text box write in the iSCSI name of both your servers connected to vCenter. In **Authorized network** text box write in the ip of both the ESXI servers you're using and in the **Comment** text box type something relevant to both your servers then click **Ok** to add the Initiator. Skip over the **Authorized Access** tab and go to the **Targets** tab. In the Targets tab click **Add Target.** In the target name text box type in a name relevant to your servers, for the **Portal Group ID** use the default main listener, and for the **Initiator Group ID** choose the number/comment you typed for your Initiator. Leave the rest default and click **Ok**. Now click on the **Extents** tab and **Add Extent**. Type in what you want as the Extent Name (Try to make it relevant to the server), for **Device** choose the **ZVOL** you created earlier, and leave everything else default click **Ok** to exit and save changes. Now on the **Associated Targets** tab click **Add Target / Extent** in the **Target** drop down section choose the corresponding target you made two steps ago. Also for **Extent** choose the extent you made in the previous step and click **Ok**.
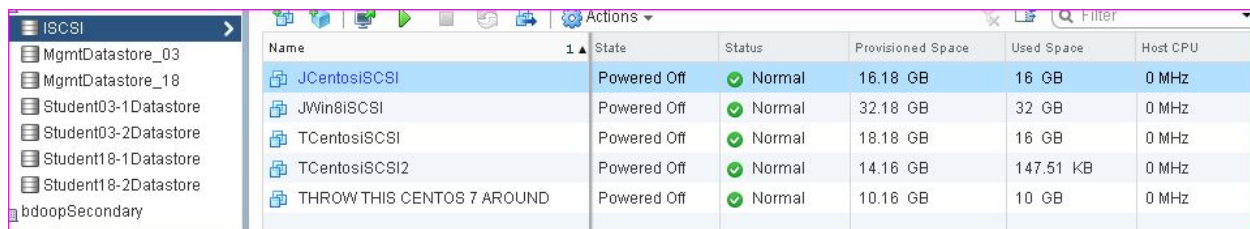
Connecting an iSCSI Datastore

Log into your Vcenter webclient, go to **Hosts and Clusters** > **Click An ESXi Server** > **Manage** > **Storage** > **Storage Adapters** and click on your iSCSI adapter. Go to the bottom under **Adapter Details** click on the **Targets** tab, click on **Static Discovery**, then **add** type in the listener for your FreeNas (10.104.142.110) and a target name ours is "iqn.2017-10.orgfreenas.ctl:vcenter18target". If this does not work try using dynamic discovery which only asks you to type in the main listeners IP. **Repeat this step for the other server you want to use for iSCSI**.

Now we can create an iSCSI datastore both servers can use and communicate through. To make a new datastore go to **Hosts and Clusters** > **Right Click on your Datacenter** > **Storage** > **New Datastore**. In the wizard leave the **Location** default and click **Next,** in the **Type** tab leave it default VMFS and click **Next**, name the Datastore click on the iSCSI disk then click next, leave **Partition Configuration** default and click **Next**, and then **finish**. Now we should have an iSCSI datastore, next we can connect VM's from both ESXi servers to the iSCSI datastore.

Setting up VM's on the iSCSI Datastore

Create a new VM for ESXI, use the iSCSI database you previously created, and make sure you have two NICS one Private and the other Internet. Make sure to do the exact same setup for the other ESXI Server you're working with.

Name		State	Status	Provisioned Space	Used Space	Host CPU
JCentosiSCSI		Powered Off	Normal	16.18 GB	16 GB	0 MHz
JWin8iSCSI		Powered Off	Normal	32.18 GB	32 GB	0 MHz
TCentosiSCSI		Powered Off	Normal	18.18 GB	16 GB	0 MHz
TCentosiSCSI2		Powered Off	Normal	14.16 GB	147.51 KB	0 MHz
THROW THIS CENTOS 7 AROUND		Powered Off	Normal	10.16 GB	10 GB	0 MHz

iSCSI
MgmtDatastore_03
MgmtDatastore_18
Student03-1Datastore
Student03-2Datastore
Student18-1Datastore
Student18-2Datastore
bdoopSecondary

VMotion

Vmotion allows movement of a virtual machine's datastore, and utilization of CPU and Ram between ESXI towers, making it very useful for maintenance.

Moving datastores with vMotion worked with default settings, so no real issues popped up here.

Vmotion allowed us to move an entire vm while it was powered on from ESXI tower to tower. We had a bit of trouble actually setting it up, as we failed to realize our infrastructure was supposed to be the same. Once we did, we ran into another issue, that being VLANS. They screwed up the vmkernel for some reason, not allowing vmotion traffic through.

Moving where the vm got its resources from was easy once we fixed our switches, vmkernel ports, and removed the vlans.

We both changed our external-vmotion nic card to the same name, External2. Note, the Vmotion port used to be on Vlan 10, in which it is not anymore.
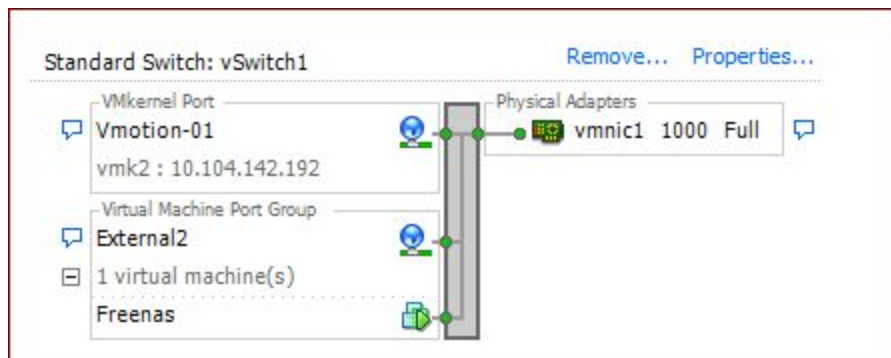
On both External switches, on the VMkernel port, we ensured that the "vMotion" setting was enabled. (under port properties)
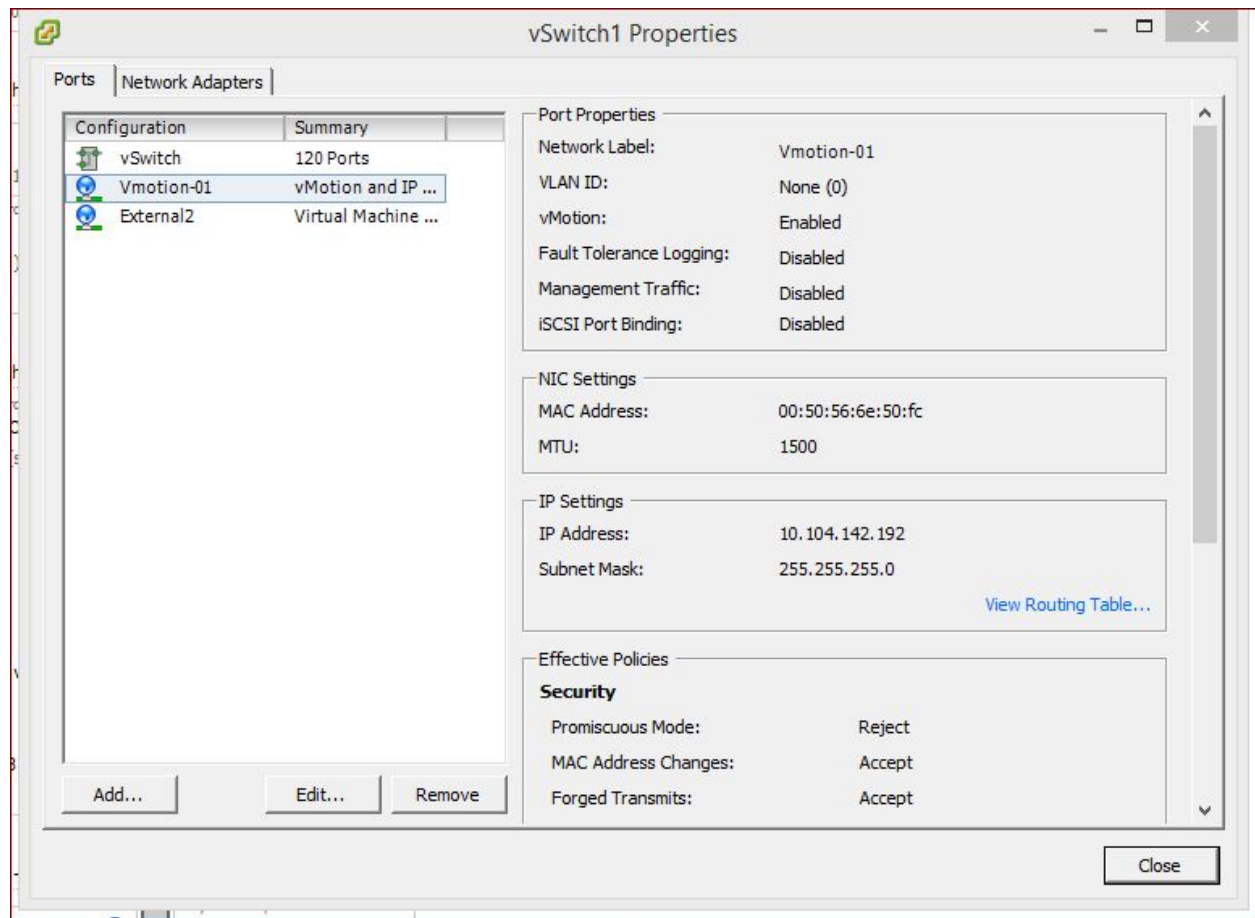
We also made a temporary switch on both towers, for movement. On a typical setup, this wouldn't affect anything.
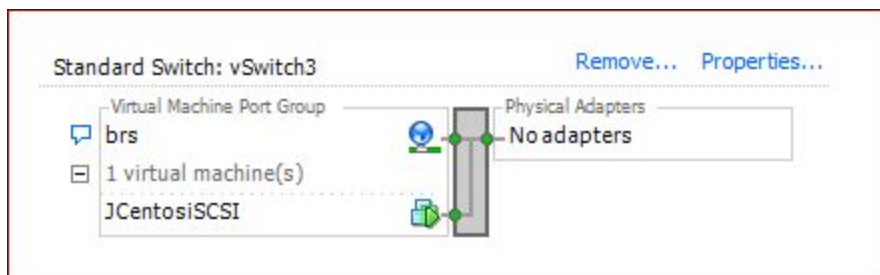
To migrate a VM, all you have to do is right click a VM, and click "migrate".
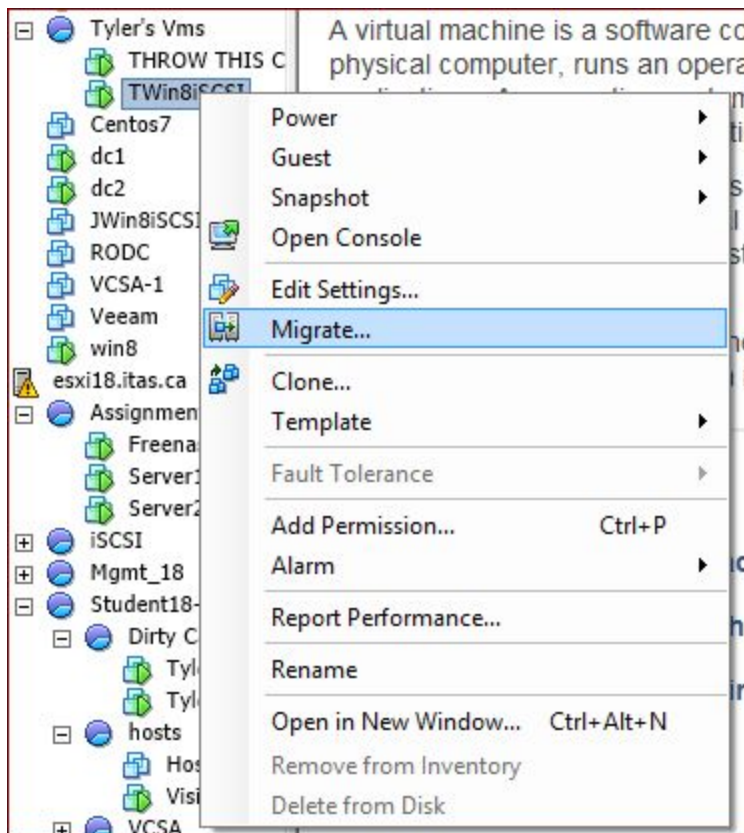
From there, you can choose if you want to change the datastore, or the host.

We'll change the host for now, moving it from esxi03, to esxi18. Select the destination and hit next. (choose tower on previous window)
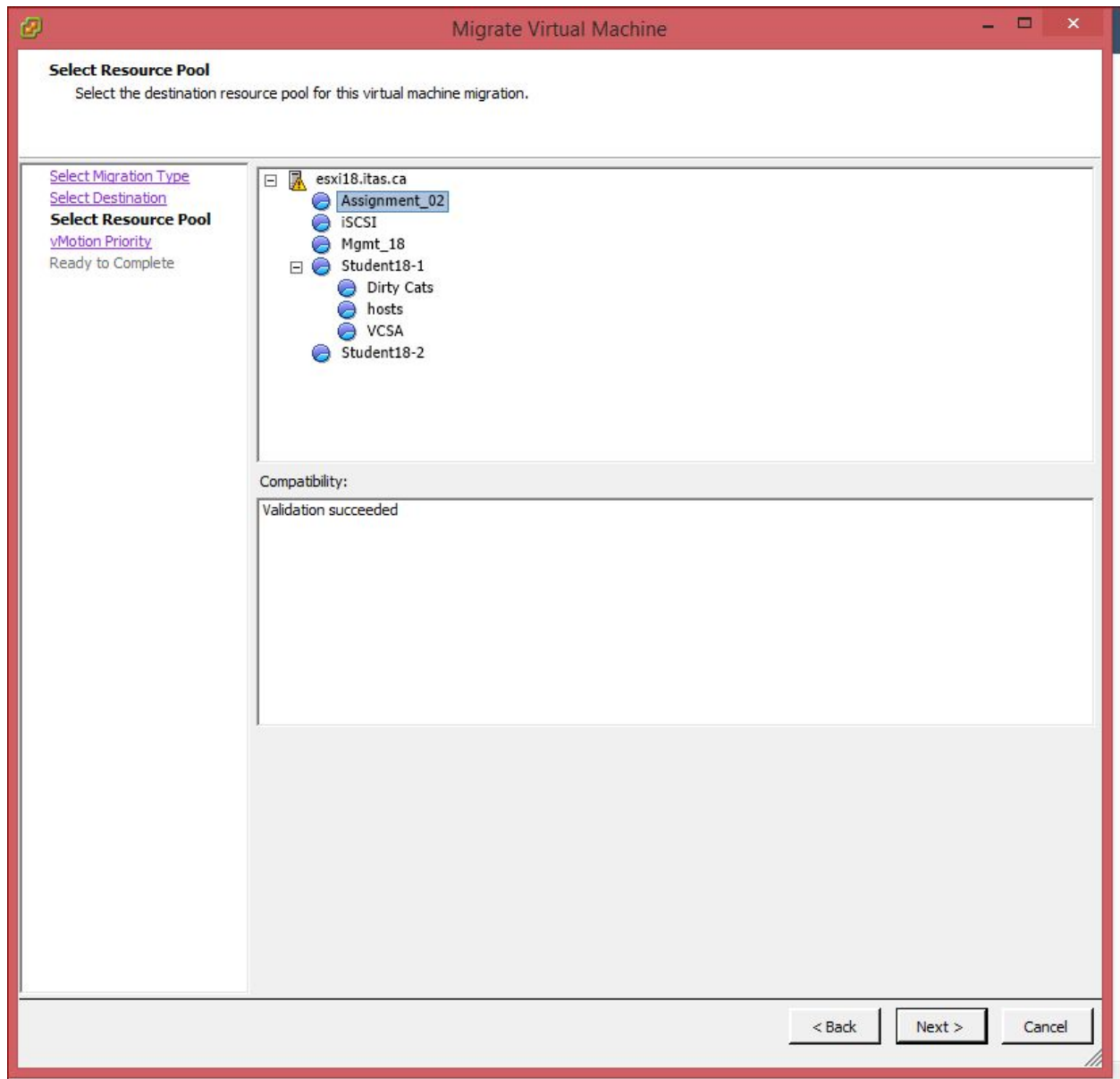
High priority should be used for important servers, and regular hosts should be used with Standard priority. We'll select High priority.

Go over the (few) settings there are, and hit finish. It'll run through, and now your vm is drawing ram/cpu from the new esxi tower!

Changing the datastore is even easier…

Migrate Virtual Machine

Select Migration Type
Change the virtual machine's host, datastore or both.

Select Migration Type
Storage
Ready to Complete

○ **Change host**
Move the virtual machine to another host.

● **Change datastore**
Move the virtual machine's storage to another datastore.

○ Change both host and datastore
Move the virtual machine to another host and move its storage to another datastore.
⚠ The virtual machine must be powered off to change the VM's host and datastore.

< Back   Next >   Cancel

Choose the datastore you want to migrate to. It can be iscsi, local, or on another machine.

Again, go over settings, and hit finish.

To move both it is not supported on the desktop client, but it is on the web client.
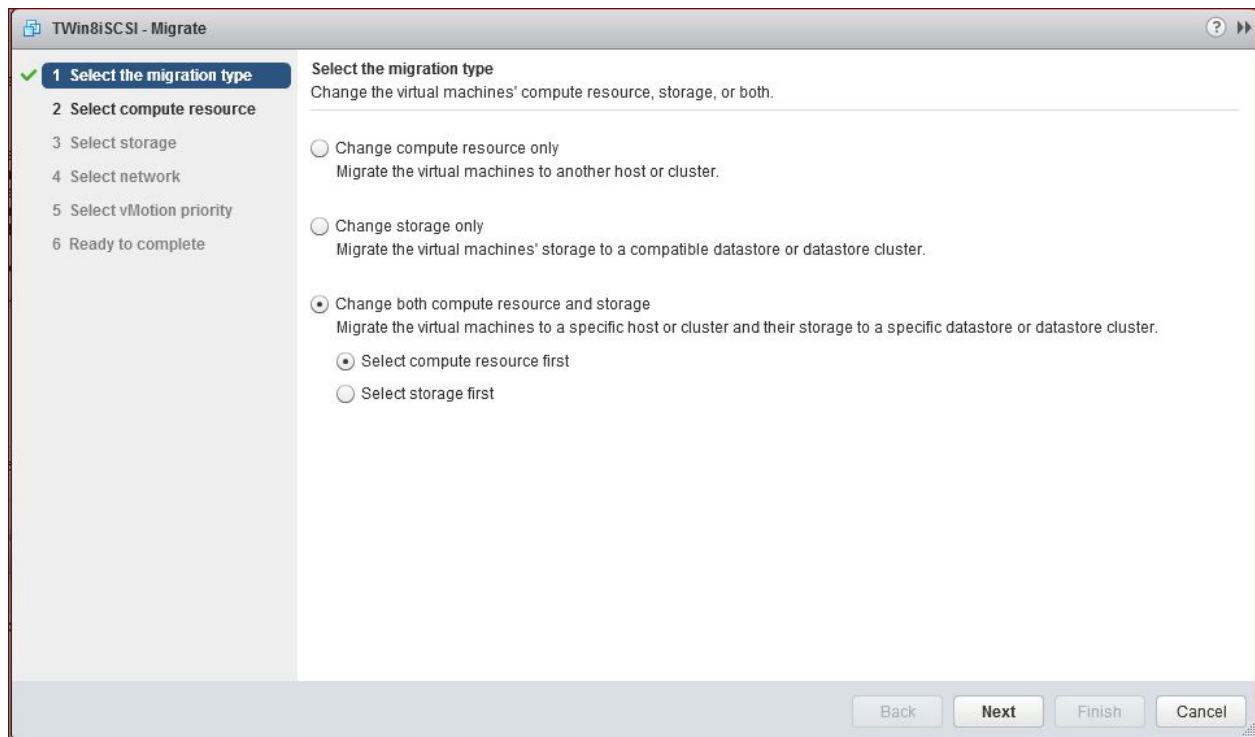
Select location again…
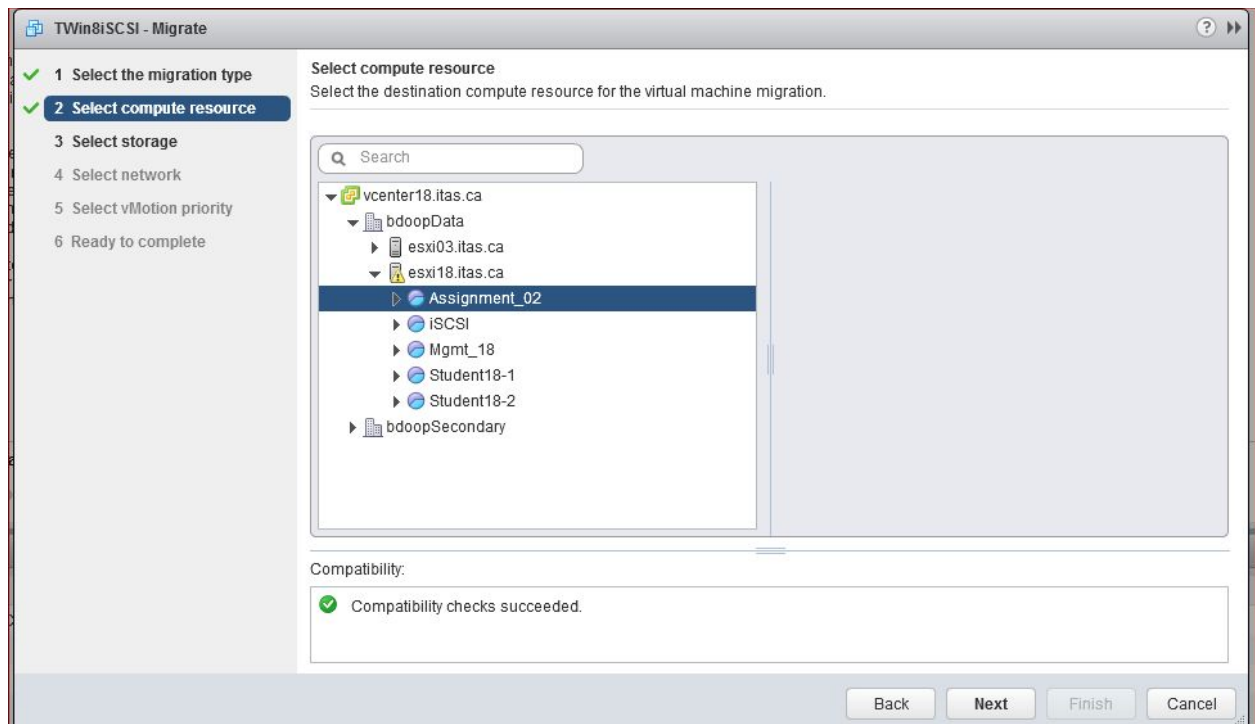
Migrating datastores requires it to be on the other tower it's going to.

Adjust nics as needed… But with aforementioned setup, this step is skippable.

Again, choose priority.

Go over settings, and hit **Finish**!

TWin8iSCSI - Migrate		

Ready to complete

The wizard is ready. Verify that the information is correct and click finish to start the migration.

- ✓ 1 Select the migration type
- ✓ 2 Select compute resource
- ✓ 3 Select storage
- ✓ 4 Select network
- ✓ 5 Select vMotion priority
- **6 Ready to complete**

Migration Type	Change compute resource and storage
Virtual Machine	TWin8iSCSI
Host	esxi18.itas.ca
Resource Pool	Assignment_02
vMotion Priority	High
Storage	[Student18-2Datastore]
Disk Format	Same format as source

Back   Next   Finish   Cancel

High Availability & Fault Tolerance

Making a Cluster

We have to pull up the new cluster wizard. Right click on your datastore, and hit "**New Cluster**".
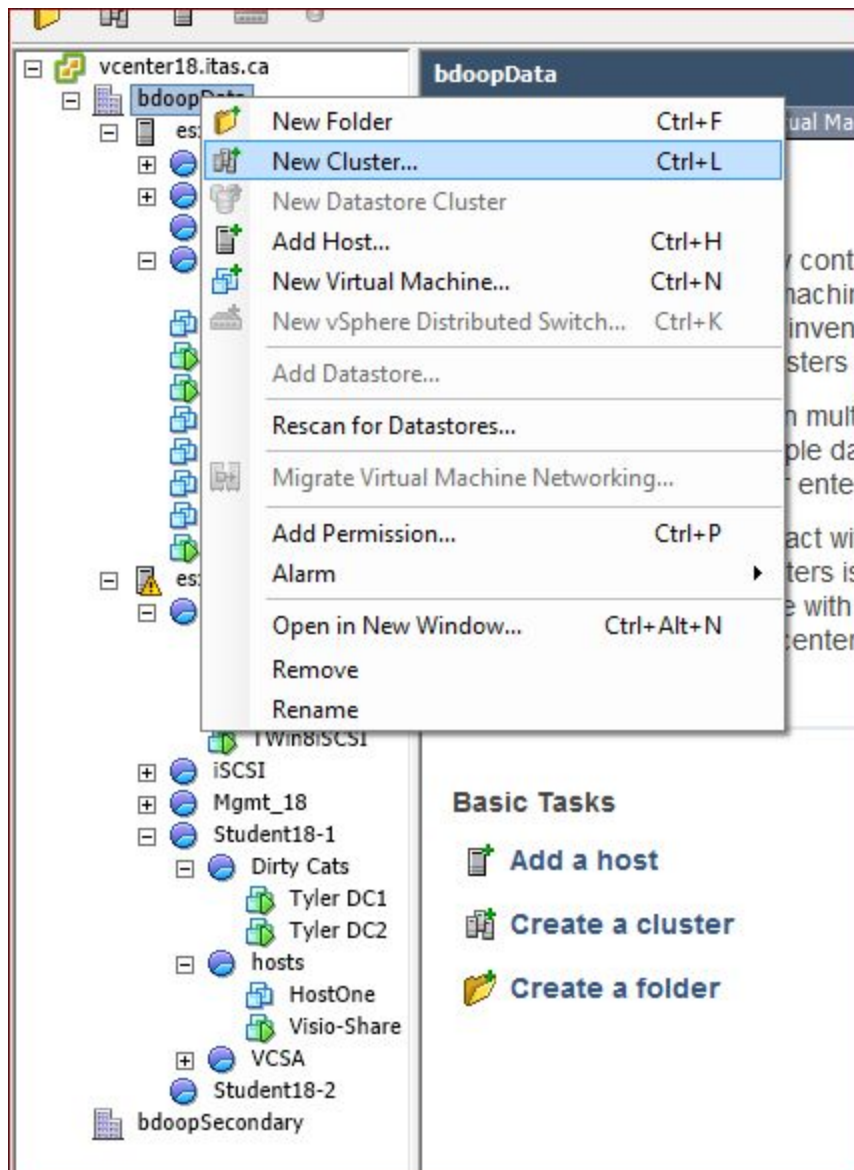
Choose a name, and select both.

New Cluster Wizard

Cluster Features

What features do you want to enable for this cluster?

Cluster Features
vSphere DRS
   Power Management
vSphere HA
   Virtual Machine Options
   VM Monitoring
VMware EVC
VM Swapfile Location
Ready to Complete

Name

Jordan-Tyler-Cluster

Cluster Features

Select the features you would like to use with this cluster.

☑ Turn On vSphere HA

vSphere HA detects failures and provides rapid recovery for the virtual machines running within a cluster. Core functionality includes host and virtual machine monitoring to minimize downtime when heartbeats cannot be detected.

vSphere HA must be turned on to use Fault Tolerance.

☑ Turn On vSphere DRS

vSphere DRS enables vCenter Server to manage hosts as an aggregate pool of resources. Cluster resources can be divided into smaller resource pools for users, groups, and virtual machines.

vSphere DRS also enables vCenter Server to manage the assignment of virtual machines to hosts automatically, suggesting placement when virtual machines are powered on, and migrating running virtual machines to balance load and enforce resource allocation policies.

vSphere DRS and VMware EVC should be enabled in the cluster in order to permit placing and migrating VMs with Fault Tolerance turned on, during load balancing.

< Back   Next >   Cancel

We want to control it, so we chose Manual.

We need lossless movement, and can't have VMs be lossless if they're not powered on....

Remember to check off the second option here. In a different environment, one might choose to have higher or lower percentages.

Medium is a fine choice for here, as we don't want restarting VMs taking huge priority over currently running VMs. If the VM can't find any network, and has HA on, it'll just power off.
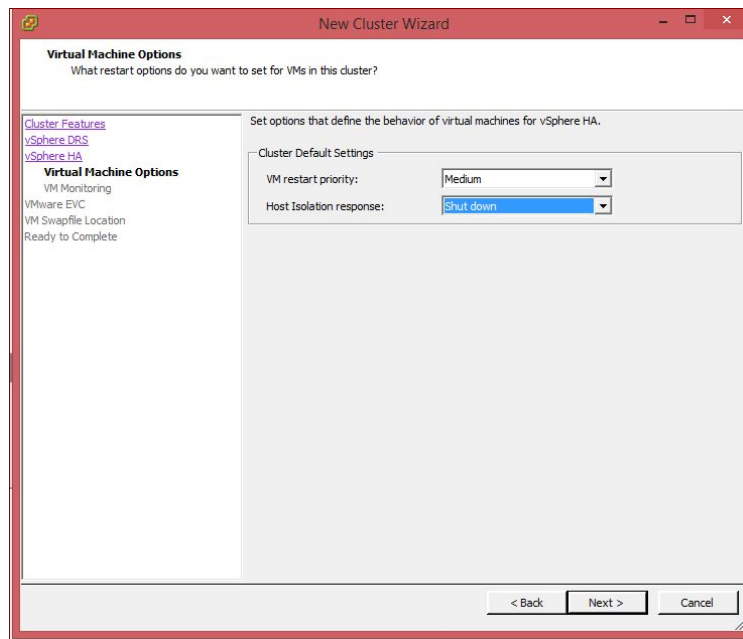
Medium is a fine choice for here, as we don't want restarting VMs taking huge priority over currently rMedium is a fine choice for here, as we don't want restarting VMs taking huge priority over currently rMedium is a fine choice for here, as we don't want restarting VMs taking huge priority over currently rMedium is a fine choice for here, as we don't want restarting VMs taking huge priority over currently rMedium is a fine choice for here, as we don't want restarting VMs taking huge priority over currently r

Medium is a fine choice for here, as we don't want restarting VMs taking huge priority over currently r

We want VMs to automatically restart if the machines heartbeat from VMware tool cannot be heard.

We do not want VMware EVC. EVC is used to be compatible with different CPUs, but since the ESXI towers we're using use the same CPUs we can skip this option.
Click **Next** to continue.

No reason to step away from the recommended setting. It'll go to the iscsi disk anyways.

New Cluster Wizard

Virtual Machine Swapfile Location
Which swapfile location policy should virtual machines use while in this cluster?

Cluster Features
vSphere DRS
vSphere HA
VMware EVC
VM Swapfile Location
Ready to Complete

Swapfile Policy for Virtual Machines

( ) Store the swapfile in the same directory as the virtual machine (recommended)

( ) Store the swapfile in the datastore specified by the host
If not possible, store the swapfile in the same directory as the virtual machine.
A host specified datastore may degrade vMotion performance for the affected virtual machines.

< Back   Next >   Cancel

Go over the settings you configured, and hit **Finish**.

High Availability

First off add the hosts into the cluster you previously created, by right clicking the cluster and clicking **add hosts into cluster**, then click the hosts you wish to add to the cluster, and click **Ok** to confirm your changes.
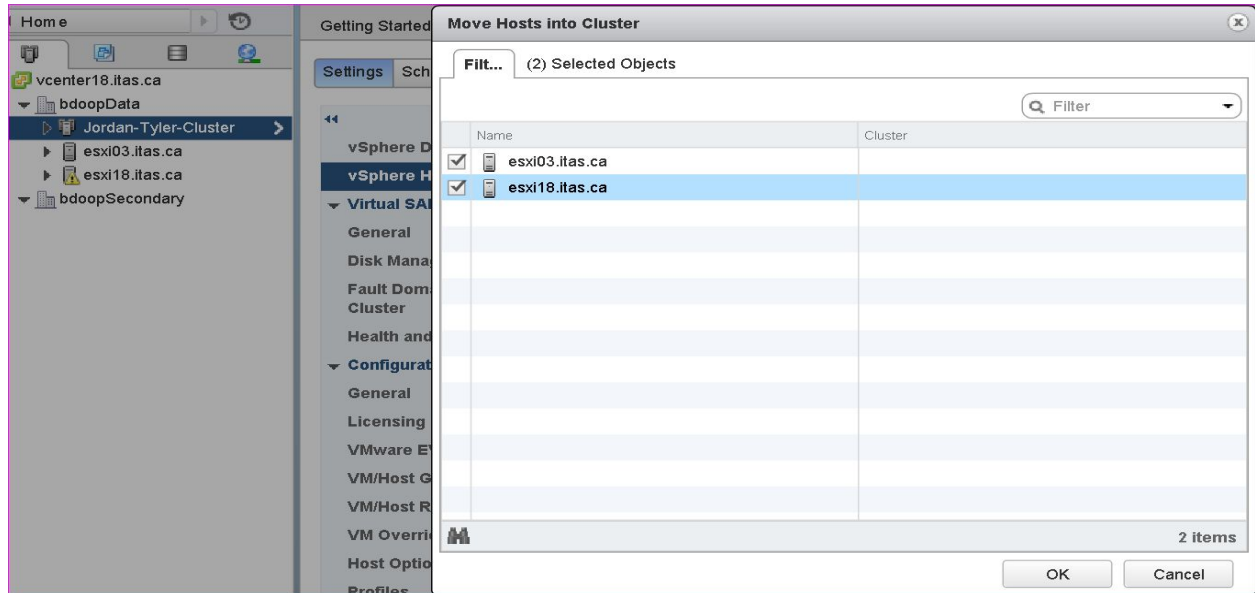
You will then go through a short wizard the first window asks if you want to create new resource pools, I say no and put them in a root resource pool then click **Ok**.
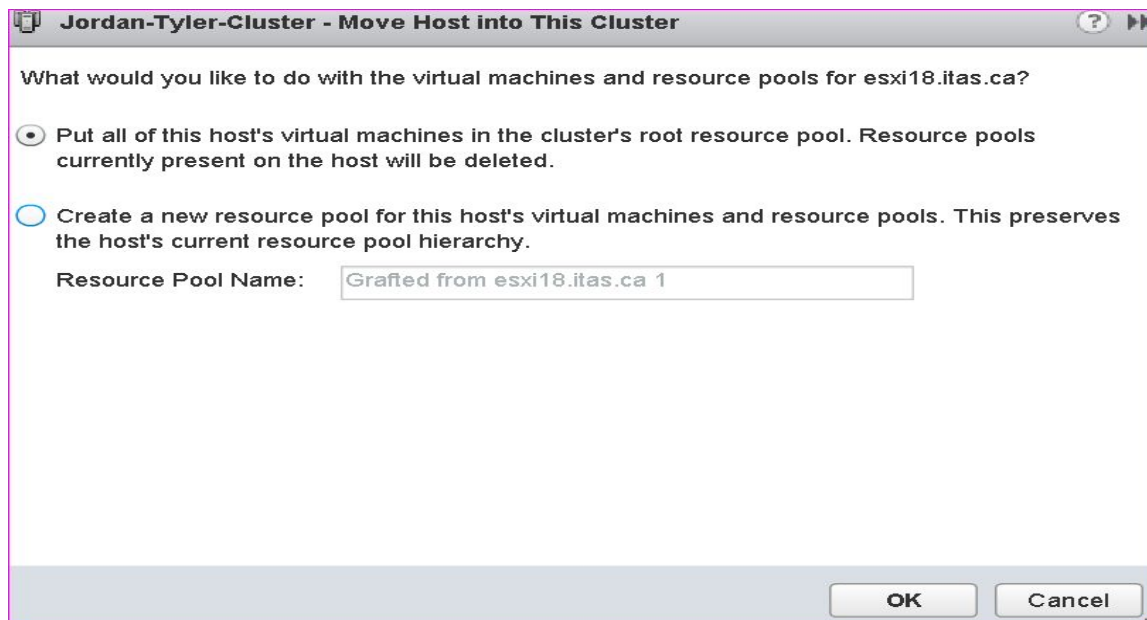
It asks you again the other host repeat the above step and click **Ok**.

Now click on your cluster go to **Settings** > **vSphere** > **Edit** and copy the following settings to have vSphere activated.

Now HA is fully functional and ready to be tested.

Fault Tolerance

Go to **ESXI > VMkernel Adapters** > **Edit** Enable Fault Tolerance Logging and click **Ok**.

Now click on your cluster go to **Settings** > **vSphere** > **Edit** inside **HA**
Under **Admission Control** Check the following check box to define a failover capacity.

Now under **Datastore for Heartbeating** select your iSCSI datastore bellow and click **O**k.

Before the next step erase snapshots on the VM you wish to test FT with
Next go **Storage** > **Datastore** > **Files** > **VMFolder** inside the VM's folder find the vmdk file, right click on it and click inflate.
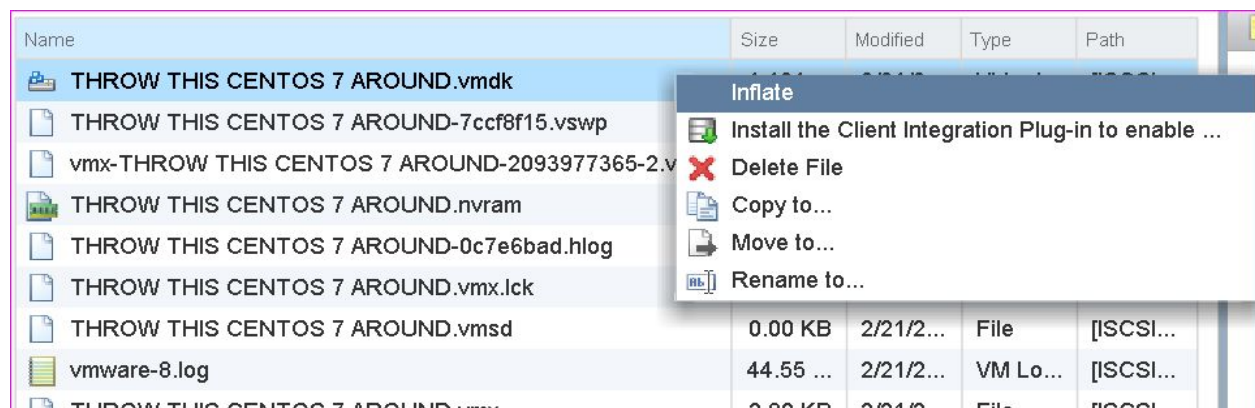
Make sure the VM is turned off and right click on it then go to **Fault tolerance** > **Turn on fault tolerance**
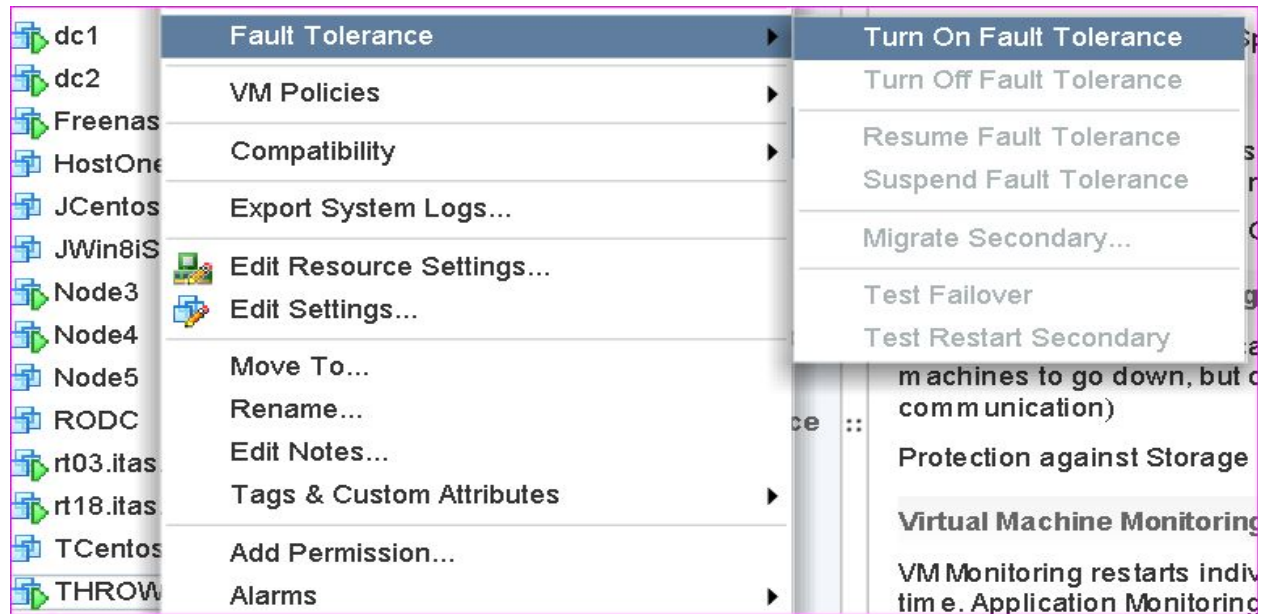
If it gives you a small warning saying you have insufficient bandwidth continue by clicking **yes.**

Next in the **Select datastores** tab under each file browse for you iSCSI datastore.

Next in the **Select host** tab choose the host you want this VM to transition over to incase of a ESXI failure.

Checkout the summary of your configurations, if everything is correct click **finish.**

Now this VM is configured and ready for Fault tolerance testing.

DRS

      First we need to enable DRS. Go to **Cluster** > **Manage** > **Settings** > **vSphere DRS** > **Edit**. Inside click the box at the top to turn on DRS, and make sure DRS Automation is set to **Manual**. Click **Ok** to save changes.

Now DRS is configured and ready for testing, we just need to manually set up a schedule.
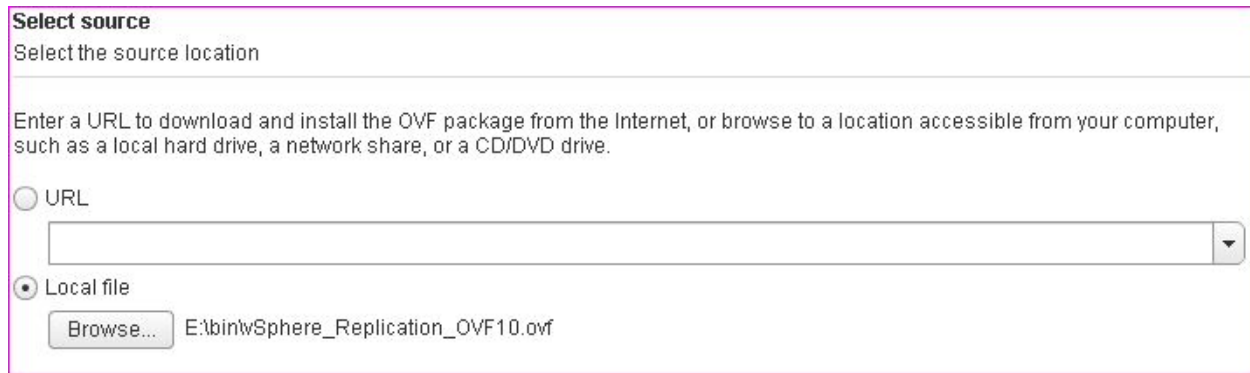
vSphere Replication Experiment

  To start download the newest version of vSphere replication appliance from vmware official website (https://my.vmware.com/group/vmware/details?productId=614&downloadGroup=VR65) Then go to **Hosts and Clusters** in the webclient right click on a host and click **Deploy OVF Template**.

First go to **Hosts and Clusters** > **Datacenter** > **Right click** > **Deploy OVF Template**
Then install the client integration plugin, after it is installed browse for a local file, mount the iso and go through the bin folder then find vSphere replication OVF file and double click on it, click **Next**.

On the next page review the details of the product and click **Next**.

The following page is the ACL, read through then click **Accept**, then **Next**.

This next page will ask where the template should be stored(You can give it name, but it should have one by default), click your datacenter and click **Next**.

The next page is the configuration page which asks you to select the amount of vCPUs, I chose 4, but you can also choose 2, and click **Next**.

On this page "**Select a recourse**" it asks you to select a location to run the deployed template, click on your cluster then click **Next**.
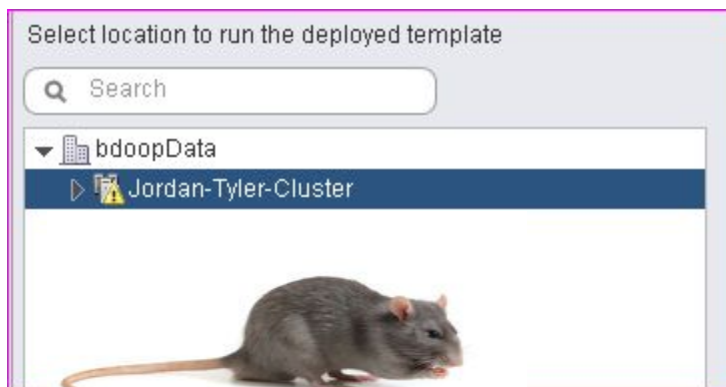
Next select a datastore that is not shared storage, and make sure the virtual disk format is thin provisioned. Click **Next**.

The next page we setup the network select the destination network to be external, leave IP protocol as IPv4, IP allocation as DHCP, and click **Next**.

Now we set a password for the new VM's root account, and if you have an ntp server put in the ip address of it or the dns address and click **Next.**

The Next page is the vService bindings page, everything should be bonded automatically, check to see if there is any errors, if not click **Next**.

Checkout your summary, click "**Power on after deployment**", if everything looks right click **Ok** to create the VM.

Now open the VM we've just created and browse to the address it gives you.

Once you have gotten there go to the **Configuration** tab. Change the SSO Administrator to a different name and make sure its @yourdomain eg. administrator@bdooprat.local.
At the top right under "**Actions**" click "**Save and Restart Service**".

Startup Configuration
Successfully saved the configuration

Configuration Mode:	◉ Configure using the embedded database
	○ Manual configuration
	○ Configure from an existing VRM database

LookupService Address:	vcenter18.itas.ca
SSO Administrator:	administrator@bdooprat.local
Password:	••••••••••
VRM Host:	10.104.142.171 Browse...
VRM Site Name:	vcenter18.itas.ca
vCenter Server Address:	vcenter18.itas.ca
vCenter Server Port:	80
vCenter Server Admin Mail:	root@10.104.142.171
IP Address for Incoming Storage Traffic:	

Apply Network Setting

Now Reboot the your vCenter VM and your Replication VM.

Now we can put vSphere replication to the Test

Right click a VM that is not using Shared storage (iSCSI for this Assignment) click on "**All vSphere Replication Actions**" then click "**Configure Replication...**"

Now in the **Configure Replication** wizard in the first tab "**Replication type**" choose **Replicate to a vCenter Server**.

Replication type
Select the type of replication to configure.

⦿ **Replicate to a vCenter Server**
Select this option to configure replication to another vCenter Server

◯ **Replicate to a cloud provider**
Select this option to configure replication to a cloud provider

Now inside "**Target Site**" choose the vCenter server you wish to replicate this VM to. If you are not connected to this vCenter server it will ask for credentials, login now that you are connected to that vCenter you can click **Next**.

Target site
Select the target site where the virtual machine will be replicated.

Name	Status
vcenter18.itas.ca	Connected
vcenter08.itas.ca	Connected

In the Replication server page choose the "**Select vSphere Replication server**" radio box, and select the **vSphere Replication Appliance**, then click **Next**.

Replication server
Select the vSphere Replication sever that will handle the replication.

◯ Auto-assign vSphere Replication server
⦿ Select vSphere Replication server

Name	Replications
vSphere Replication Appliance (Embedded)	1

Now in **Target location** click **Edit** to select the Target VM's location. Choose a
datastore then click **Ok.**

Leave the Replication options tab to it's defaults and click **Next**.

Now in Recovery settings change the **RPO** to 15 minutes by dragging the scrollbar to
the left.

Enable Point in time instances and change the days to 3 days then click **Ok** to move on
to the summary page.

Now in the summary page review your configurations, if everything is right press **Ok**; otherwise click **Back** to fix your issues.

Replication to another vCenter server will only start once the setup VM is turned on.

Now the vSphere Replication appliance should be set up and running and ready for testing purposes.

vCenter Appliance backup

For this part of the Assignment we will be using **Veeam Backup & Replication**, the objective of this to have our vCenter server recoverable within at least 15 minutes with relatively new data. If you need help getting the initial part of Veeam set up please check out one of the previous guides we made (ITAS278_Assignment01_Tyler.Wiersma, or ITAS_Assignment01_Jordan.Brown). It's recommended to have another drive besides your **C:** drive, so we made a **D:** drive of around 100**GB**.

Once Veeam is set up and configured connect to the ESXI server your vCenter is running on, in our case this is our ESXI18 server. To do this click **Add Server** at the top left, then in the **Add Server** page click **VMWARE VSPHERE**, and type in the servers IP or DNS.
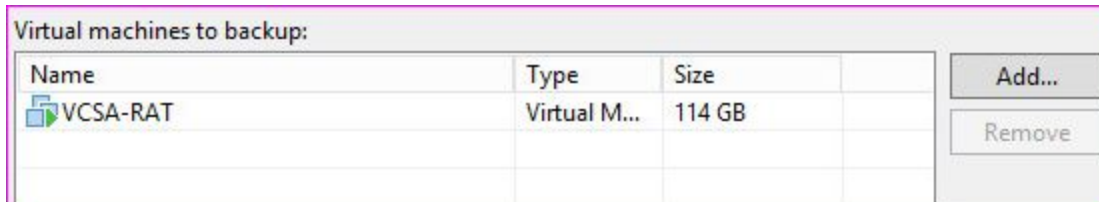
On the next page "**Credentials**" click **Add** and type in the username and password of the ESXI server and click **Ok**, then **Next**. If it prompts you with a Security Warning click **Connect**.

Next it will show a Summary, if you had no errors and the summary of your configuration looks right click **Finish**.

Next we will start a backup and a Replication job.

Backup Job

At the bottom left of Veeam go to the **Home** tab, then at the top click **Backup Job** >
VMware vSphere. Give the backup job a name and click **Next**. On the next page click
Add and select the vCenter server, click **Next**.

Virtual machines to backup:			
Name	Type	Size	Add...
VCSA-RAT	Virtual M...	114 GB	Remove

Leave the next page "**Storage**" of the wizard to its defaults and click **Next**.

Same for the "**Guest Processing**" leave it as default and click **Next**.

In the Schedule page set up a schedule if you wish, but for this example we will be
doing one manual backup job, click **Apply** to continue.

In the Summary check over your configurations and check the button at the bottom left
to "**Run the job when I click Finish**" and click **Finish** to initialize the backup.

Summary:
Name: vSphere_Backup
Target Path: D:\Vcenter_Backup
Type: VMware Backup
Source items:
        VCSA-RAT (10.104.142.18)
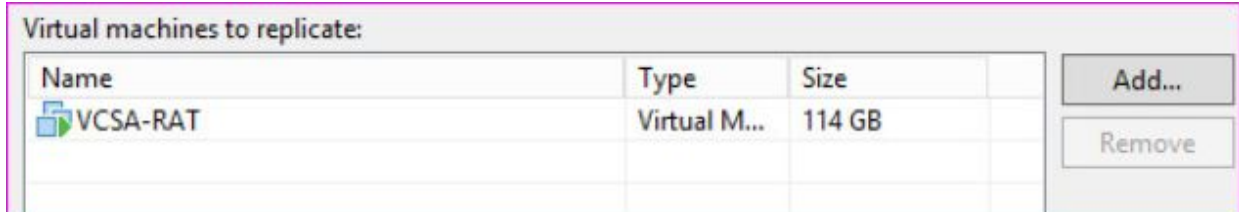
Command line to start the job on backup server:
"C:\Program Files\Veeam\Backup and Replication\Backup\Veeam.Backup.Manager.exe" backup
983786c9-c009-4741-8e5b-a87694499f32

☑ Run the job when I click Finish

[< Previous] [Next >] [Finish] [Cancel]

Replication Job

At the bottom left of Veeam go to the **Home** tab, then at the top click **Replication Job** > **VMware vSphere**. Give the replication job a name and click **Next**. On the next page click **Add** and select the vCenter server, click **Next**.
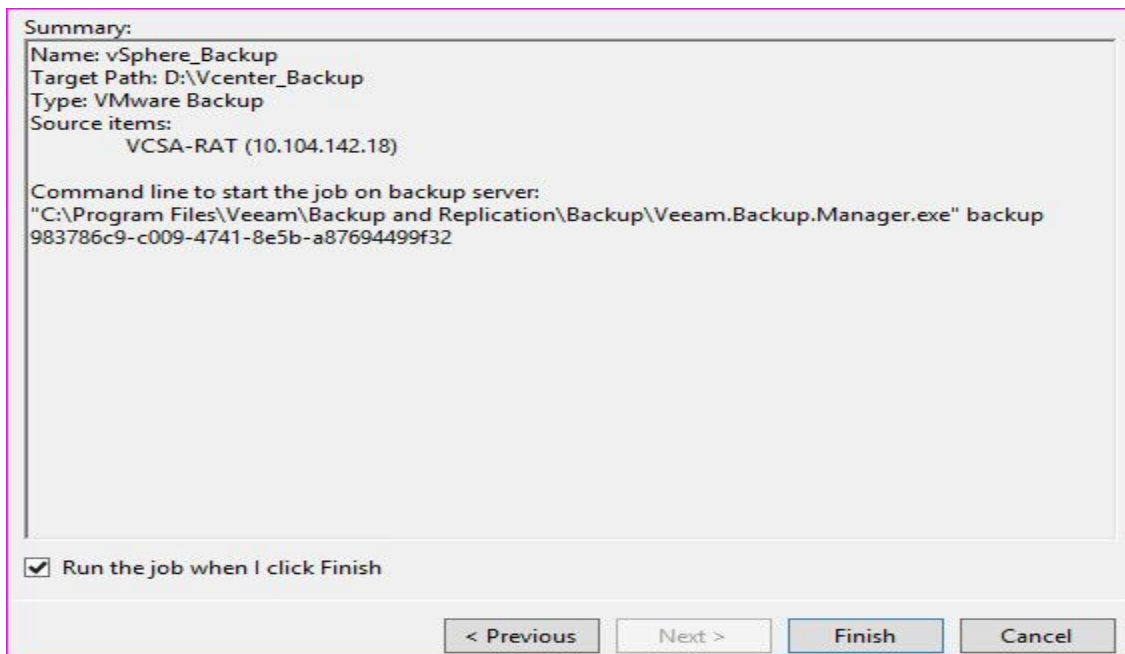

On the next page "**Destination**" for the Host or Cluster option choose the other ESXI tower, and at the bottom choose a Datastore for it then click **Next**.

Leave the next page "**Job Settings**" to its defaults and click **Next**.

On the next page "**Data Transfer**" leave the proxy settings as Automatic selection and click **Next**.

Leave the next page "**Guest Processing**" as default and click **Next**.

For the "**Schedule**" page check the box "**Run the job automatically**" and if you've got enough room in your storage hard drive click the radio box "**Periodically every**" then set it to 15 minutes, and set the "**Retry failed items processing**" to 3 items, hit **Apply**.

In the summary make sure you configured everything right, if so click **Finish** to begin the periodic replication.

Now the vCenter VM has redundancy and can replicate in the case of a failure.

Conclusion

We've gone through iSCSI, vMotion, HA, FT, DRS, Replication to a partner, and a solution to backup our VSCA. Having your computers "always on" using these redundant technologies is crucial to running a successful business, and in this assignment we went over and figured out how all of these technologies work.

References

- https://www.google.ca/search?q=vmotion+memes&client=opera&hs=zuk&source=lnms&tbm=isch&sa=X&ved=0ahUKEwii_eKo66PZAhUNwWMKHdutDRAQ_AUICigB&biw=1280&bih=649
- https://docs.vmware.com/en/VMware-vSphere/6.0/com.vmware.vsphere.avail.doc/GUID-83FE5A45-8260-436B-A603-B8CBD2A1A611.html
- https://docs.vmware.com/en/VMware-vSphere/6.0/com.vmware.vsphere.avail.doc/GUID-57929CF0-DA9B-407A-BF2E-E7B72708D825.html
- https://docs.vmware.com/en/VMware-vSphere/6.0/com.vmware.vsphere.storage.doc/GUID-4ED3304A-ED4F-4692-825F-83637E04D592_copy.html
- https://www.youtube.com/watch?v=t3B1biwVVmg
- https://www.youtube.com/watch?v=Lr2oSy4wb8s
- https://www.youtube.com/watch?v=IZC3gHgsd4k
- https://www.youtube.com/watch?v=QuR3FmN_UPo
- https://www.youtube.com/watch?v=KV4W2i4ckrs
- https://www.youtube.com/watch?v=YH0he0nz8Mg
- https://www.youtube.com/watch?time_continue=48&v=xLoX7tlduWs
- https://www.youtube.com/watch?v=hgasvZrRkzc
- https://www.youtube.com/watch?v=WQJZNwuq15Y
- https://www.youtube.com/watch?v=yGX2QLutpdM
- https://www.youtube.com/watch?v=EWRs36nS5F0