

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**.

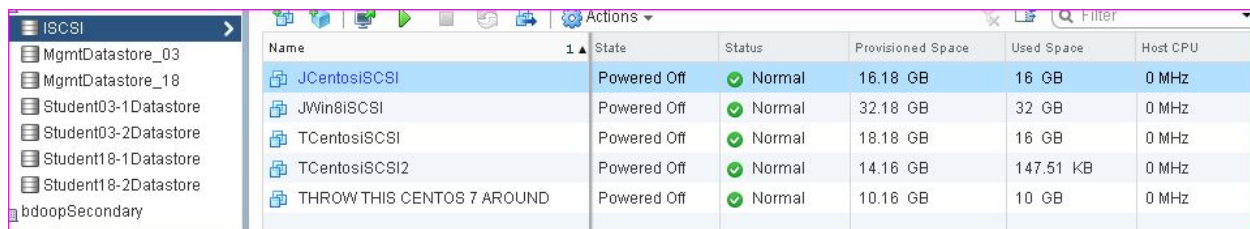
Connecting an iSCSI Datastore

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.

The screenshot shows the vSphere Storage browser interface. On the left, a tree view lists various datastores under the 'iSCSI' category, including 'MgmtDatastore_03', 'MgmtDatastore_18', and several 'Student' datastores. The main pane displays a table of iSCSI datastores. The table has columns for Name, State, Status, Provisioned Space, Used Space, and Host CPU. Five datastores are listed: JCentosiSCSI, JWin8iSCSI, TCentosiSCSI, TCentosiSCSI2, and THROW THIS CENTOS 7 AROUND. All are in a 'Powered Off' state with a 'Normal' status. The 'THROW THIS CENTOS 7 AROUND' datastore is highlighted in blue.

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

VMotion

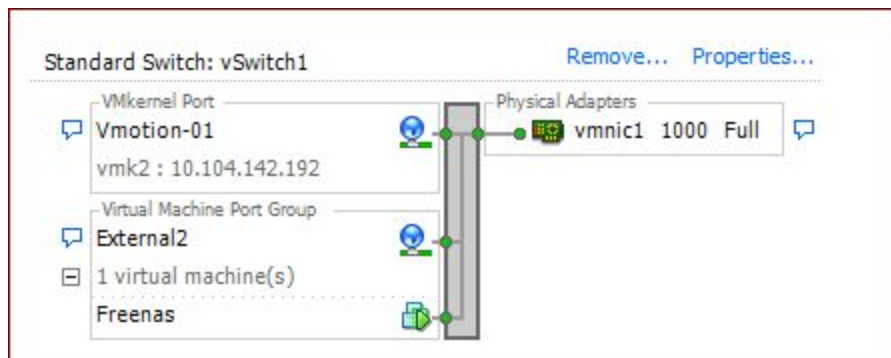
Vmotion allows movement of a virtual machine's datastore, and utilization of CPU and Ram between ESXI towers, making it very useful for maintenance.

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

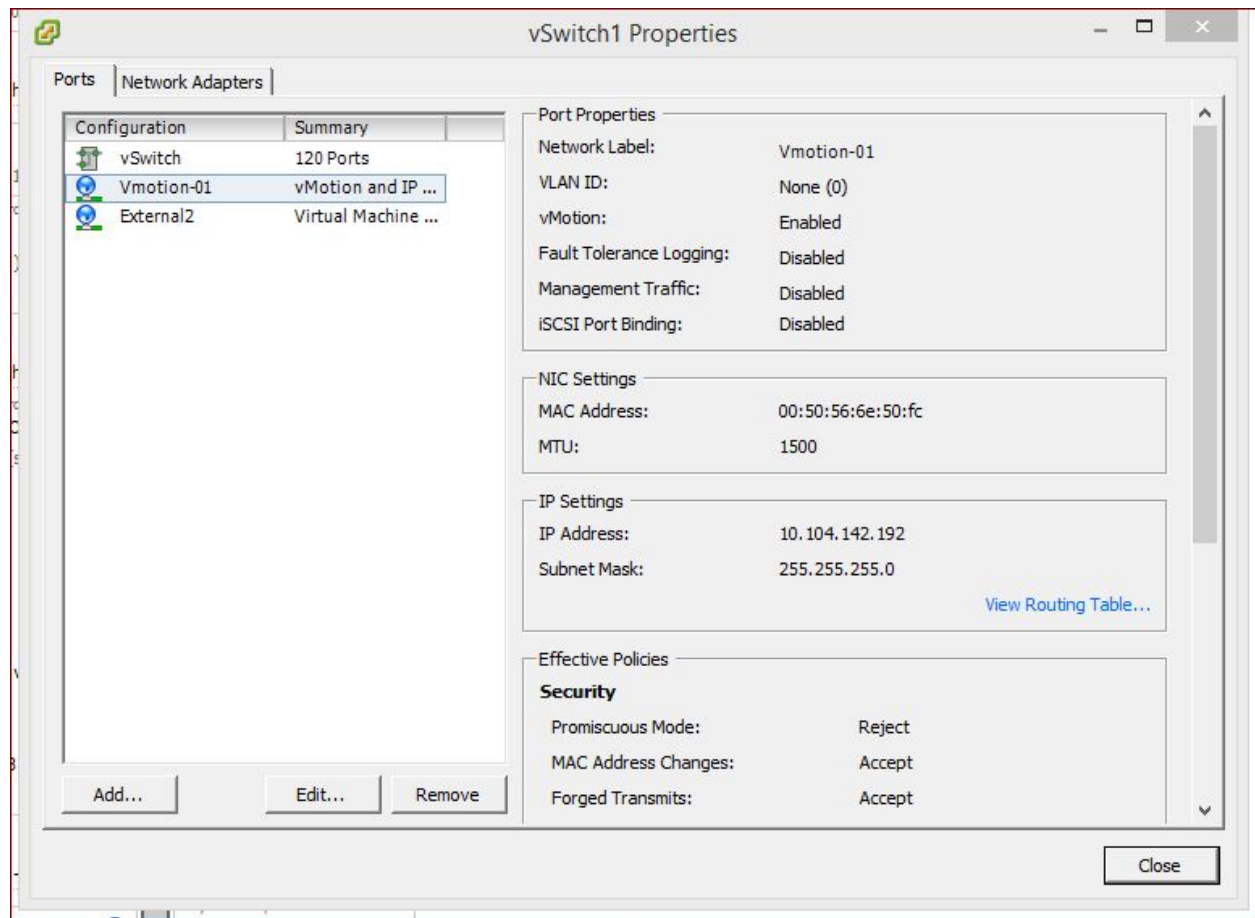
Vmotion allowed us to move an entire vm while it was powered on from ESXI tower to tower. We had a bit of trouble actually setting it up, as we failed to realize our infrastructure was supposed to be the same. Once we did, we ran into another issue, that being VLANS. They screwed up the vmkernel for 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.

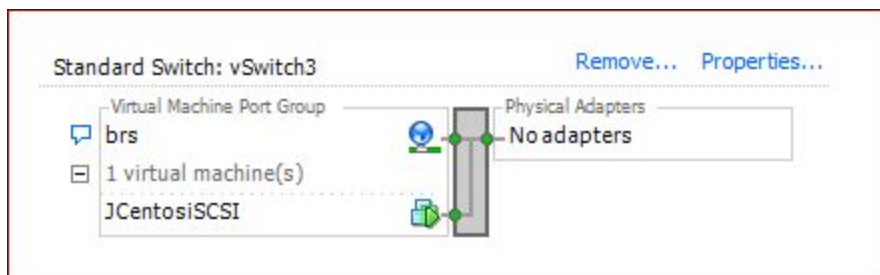
We both changed our external-vmotion nic card to the same name, External2. Note, the Vmotion port used to be on Vlan 10, in which it is not anymore.



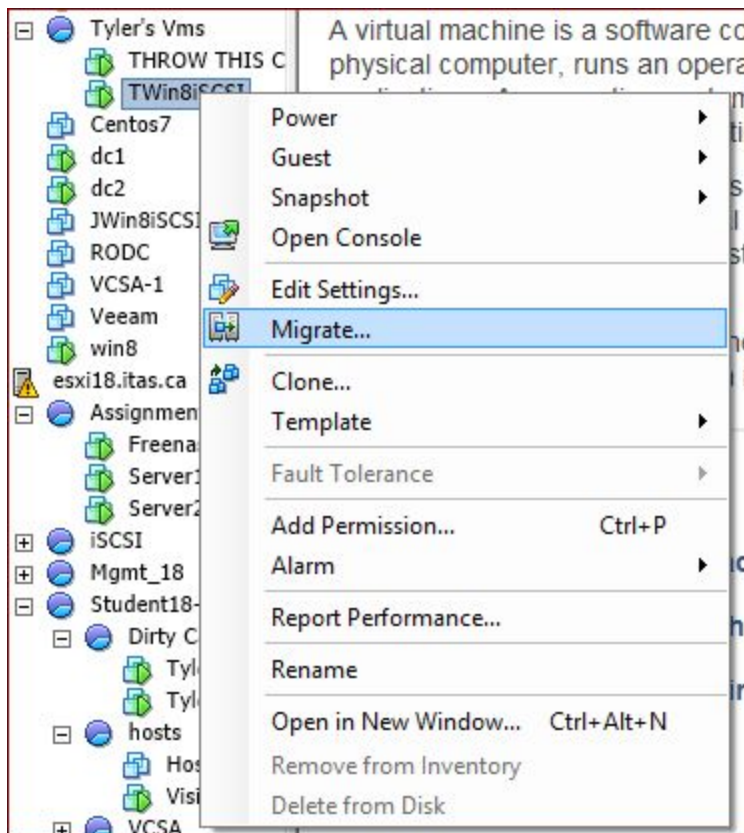
On both External switches, on the VMkernel port, we ensured that the “vMotion” setting was enabled. (under port properties)



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.

The screenshot shows a window titled "Migrate Virtual Machine" with standard window controls (minimize, maximize, close). The main content area is titled "Select Migration Type" with the instruction "Change the virtual machine's host, datastore or both." Below this, there is a sidebar on the left and a main panel on the right. The sidebar, also titled "Select Migration Type", contains a list of steps: "Select Destination", "Select Resource Pool", "vMotion Priority", and "Ready to Complete". The main panel contains three radio button options: "Change host" (selected), "Change datastore", and "Change both host and datastore". Each option has a descriptive text line below it. The "Change both host and datastore" option includes a yellow warning icon and a note stating that the virtual machine must be powered off. At the bottom right of the window, there are three buttons: "< Back", "Next >", and "Cancel".

Migrate Virtual Machine

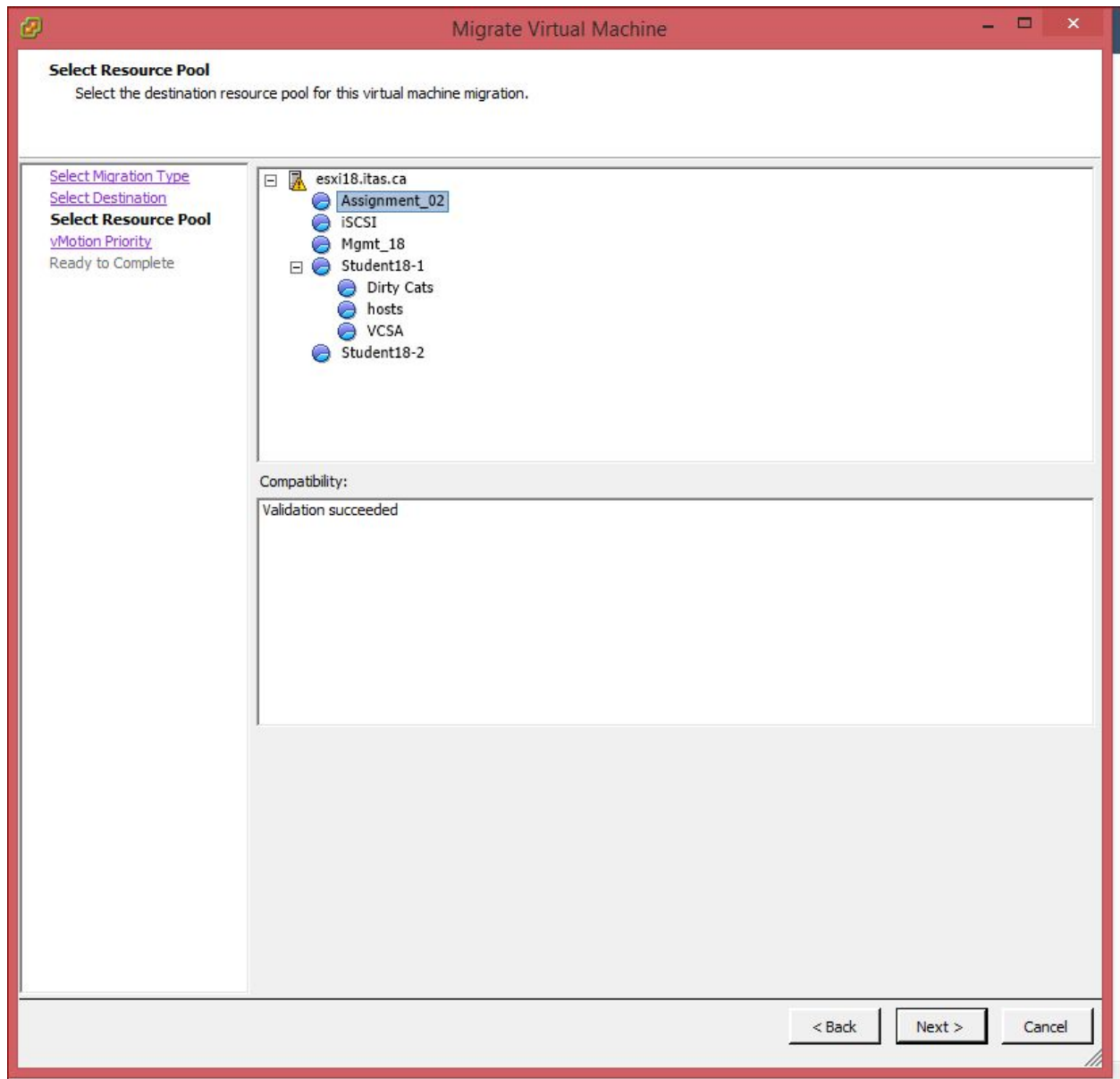
Select Migration Type
Change the virtual machine's host, datastore or both.

Select Migration Type
Select Destination
Select Resource Pool
vMotion Priority
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

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.

The screenshot shows a Windows-style window titled "Migrate Virtual Machine". Inside, the "vMotion Priority" step is active, with the instruction "Set the priority of the vMotion migrations, relative to the other operations on the destination host." On the left, a sidebar lists navigation links: "Select Migration Type", "Select Destination", "Select Resource Pool", "vMotion Priority" (highlighted), and "Ready to Complete". The main area contains two radio button options: "High priority (Recommended)" which is selected, and "Standard priority". Below these options, a note states: "High priority vMotions are favored over standard priority vMotions and are expected to perform better." At the bottom right, there are three buttons: "< Back", "Next >", and "Cancel".

Migrate Virtual Machine

vMotion Priority
Set the priority of the vMotion migrations, relative to the other operations on the destination host.

[Select Migration Type](#)
[Select Destination](#)
[Select Resource Pool](#)
vMotion Priority
[Ready to Complete](#)

☒ High priority (Recommended)
☐ Standard priority

High priority vMotions are favored over standard priority vMotions and are expected to perform better.

< Back Next > Cancel

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!

Migrate Virtual Machine

Ready to Complete
Click Finish to start migration

[Select Migration Type](#)
[Select Destination](#)
[Select Resource Pool](#)
[vMotion Priority](#)
Ready to Complete

Host:	esxi18.itas.ca
ResourcePool:	Assignment_02
Datastore:	Current Location
vMotion Priority:	High priority

< Back Finish Cancel

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.

Migrate Virtual Machine

Storage

Select the destination storage for this virtual machine migration.

Select Migration Type

Storage

Ready to Complete

Select a virtual disk format:

Same format as source

Select a destination storage for the virtual machine files:

Name	Drive Type	Capacity	Provisioned	Free	Type	Thin Provisioning
ISCSI	SSD	249.75 GB	121.21 GB	141.81 GB	VMFS5	Supported
MgmtDatastor...	SSD	104.25 GB	25.26 GB	80.15 GB	VMFS5	Supported
Student03-1Da...	SSD	447.00 GB	391.41 GB	227.48 GB	VMFS5	Supported
Student03-2Da...	SSD	447.00 GB	425.96 GB	347.03 GB	VMFS5	Supported

☐ Disable Storage DRS for this virtual machine

Select a datastore:

Name	Drive Type	Capacity	Provisioned	Free	Type	Thin Provisioning
------	------------	----------	-------------	------	------	-------------------

Advanced >>

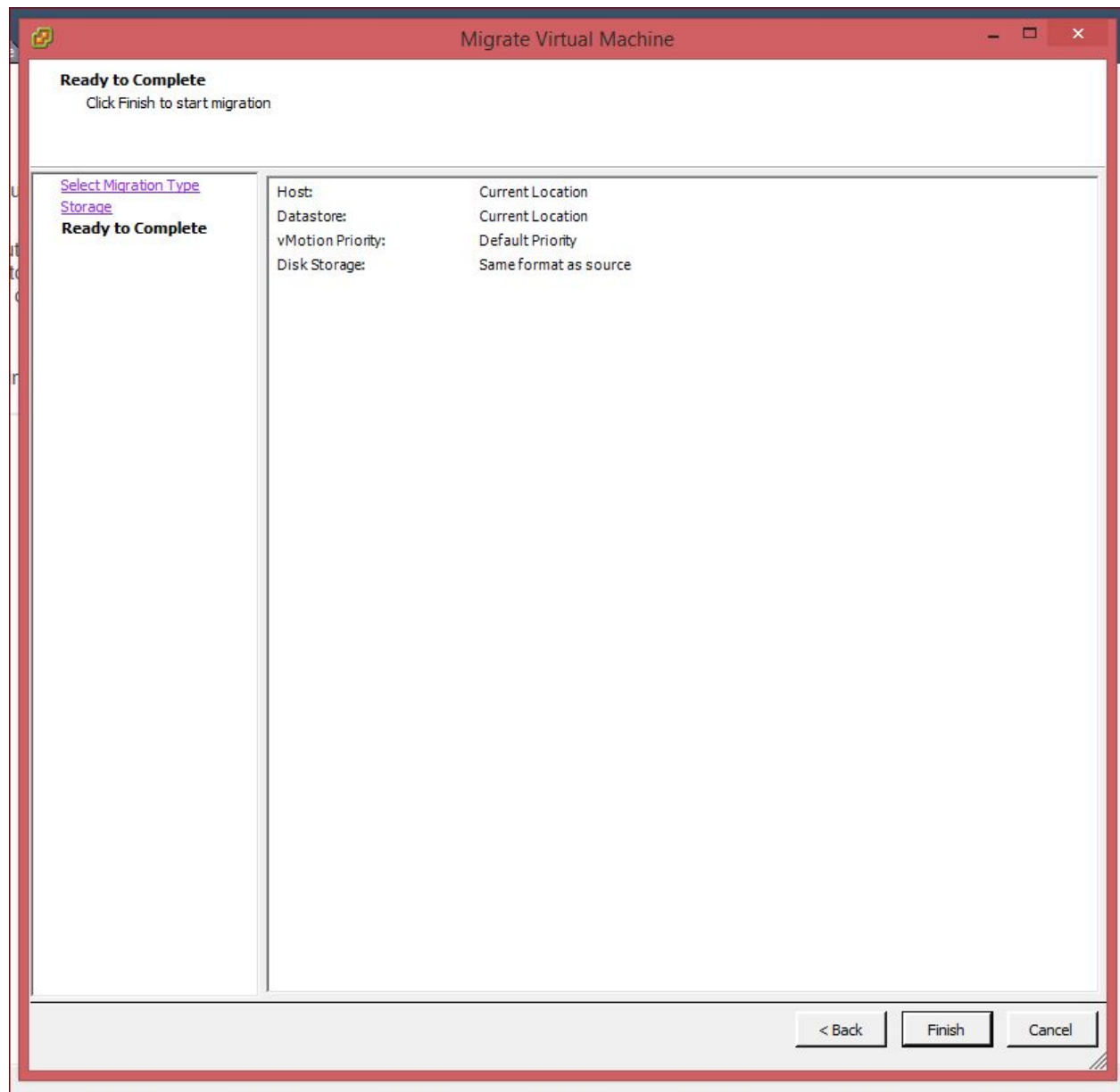
Compatibility:
Validation succeeded

< Back

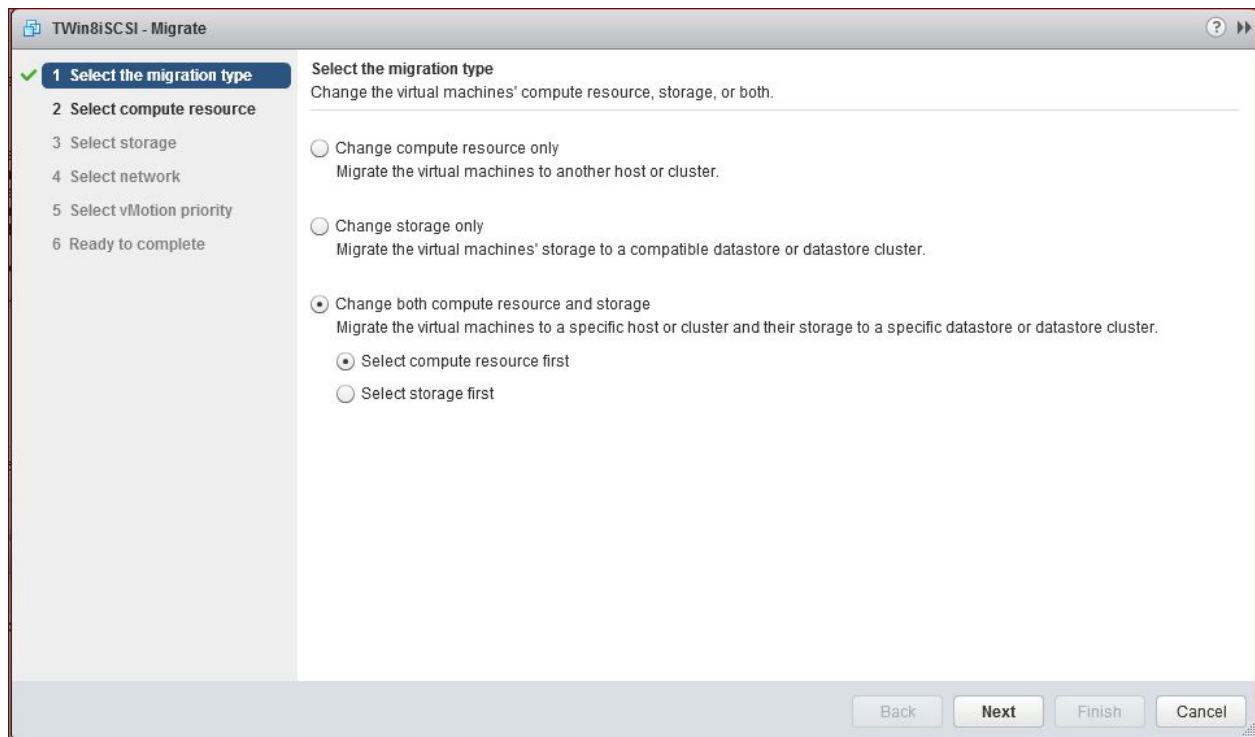
Next >

Cancel

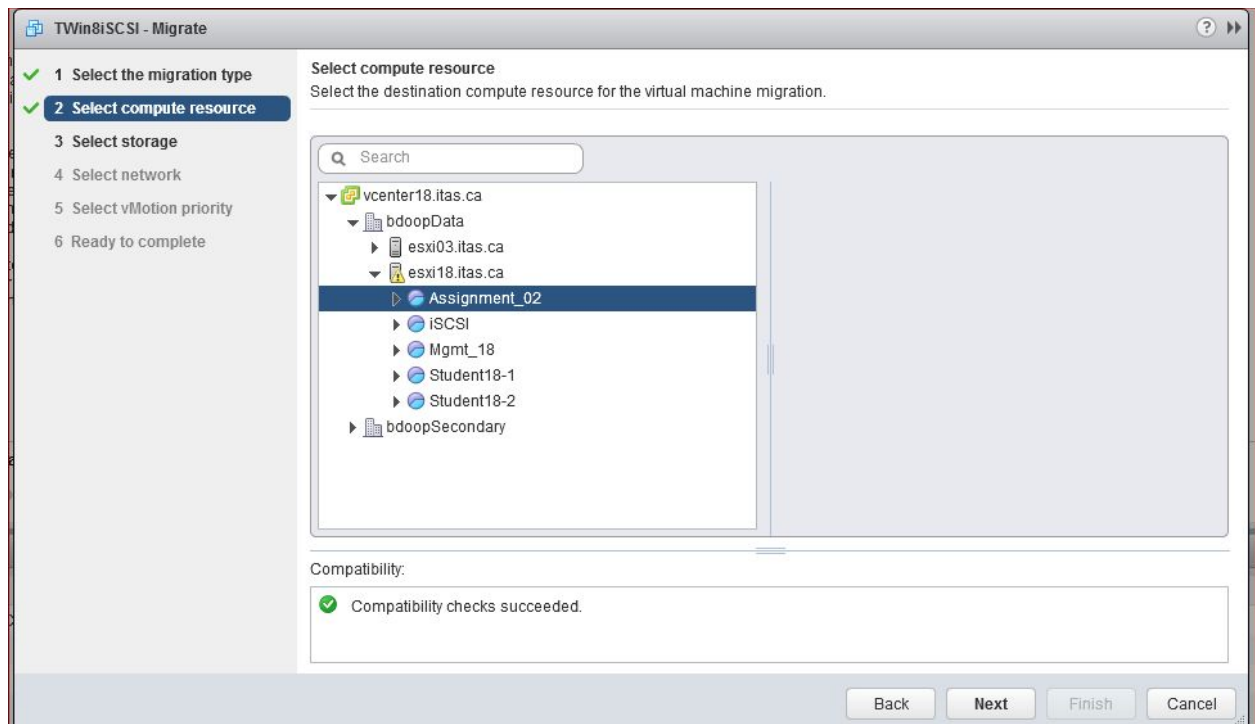
Again, go over settings, and hit finish.



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.

1 Select the migration type

2 Select compute resource

3 Select storage

4 Select network

5 Select vMotion priority

6 Ready to complete

Select storage

Select the destination storage for the virtual machine migration.

Select virtual disk format: Same format as source

VM Storage Policy: Keep existing VM storage policies

The following datastores are accessible from the destination resource that you selected. Select the destination datastore for the virtual machine configuration files and all of the virtual disks.

Name	Capacity	Provisioned	Free	Type	Storage DRS
Student18-2Datastore	447.00 GB	282.49 GB	213.64 GB	VMFS	
MgmtDatastore_18	216.00 GB	40.14 GB	178.02 GB	VMFS	
ISCSI	249.75 GB	121.21 GB	141.81 GB	VMFS	
Student18-1Datastore	447.00 GB	786.95 GB	28.76 GB	VMFS	

Advanced >>

Compatibility:

TWin8iSCSI

esxi18.itas.ca

BackNextFinishCancel

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

The screenshot shows the 'Select network' step in the 'TWIn8i SCSI - Migrate' wizard. The left sidebar lists six steps: 1. Select the migration type, 2. Select compute resource, 3. Select storage, 4. Select network (highlighted), 5. Select vMotion priority, and 6. Ready to complete. The main area is titled 'Select network' and contains the instruction: 'Select the destination network for the virtual machine migration.' Below this, a text box says: 'Migrate VM networking by selecting a new destination network for all VM network adapters attached to the same source network.' A table with three columns is displayed: 'Source Network', 'Used By', and 'Destination Network'. The first two columns are populated with 'brs' and 'External2', each with '1 VMs / 1 Network adapters' in the 'Used By' column. The 'Destination Network' column has dropdown menus with 'brs' and 'External2' selected. An 'Advanced >>' button is at the bottom right of the table. Below the table, a 'Compatibility:' section shows a green checkmark and the text 'Compatibility checks succeeded.' At the bottom of the wizard are 'Back', 'Next', 'Finish', and 'Cancel' buttons.

Source Network	Used By	Destination Network
brs	1 VMs / 1 Network adapters	brs
External2	1 VMs / 1 Network adapters	External2

Again, choose priority.

The screenshot shows the 'Select vMotion priority' step in the 'TWIn8i SCSI - Migrate' wizard. The left sidebar lists six steps: 1. Select the migration type, 2. Select compute resource, 3. Select storage, 4. Select network, 5. Select vMotion priority (highlighted), and 6. Ready to complete. The main area is titled 'Select vMotion priority' and contains the instruction: 'Protect the performance of your running virtual machines by prioritizing the allocation of CPU resources.' Below this, there are two radio button options. The first option, 'Schedule vMotion with high priority (recommended)', is selected. It includes a sub-note: 'vMotion receives higher CPU scheduling preference relative to normal priority migrations. vMotion might complete more quickly.' The second option is 'Schedule regular vMotion', with a sub-note: 'vMotion receives lower CPU scheduling preference relative to high priority migrations. You can extend vMotion duration.' At the bottom of the wizard are 'Back', 'Next', 'Finish', and 'Cancel' buttons.

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

TWin8iSCSI - Migrate

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

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

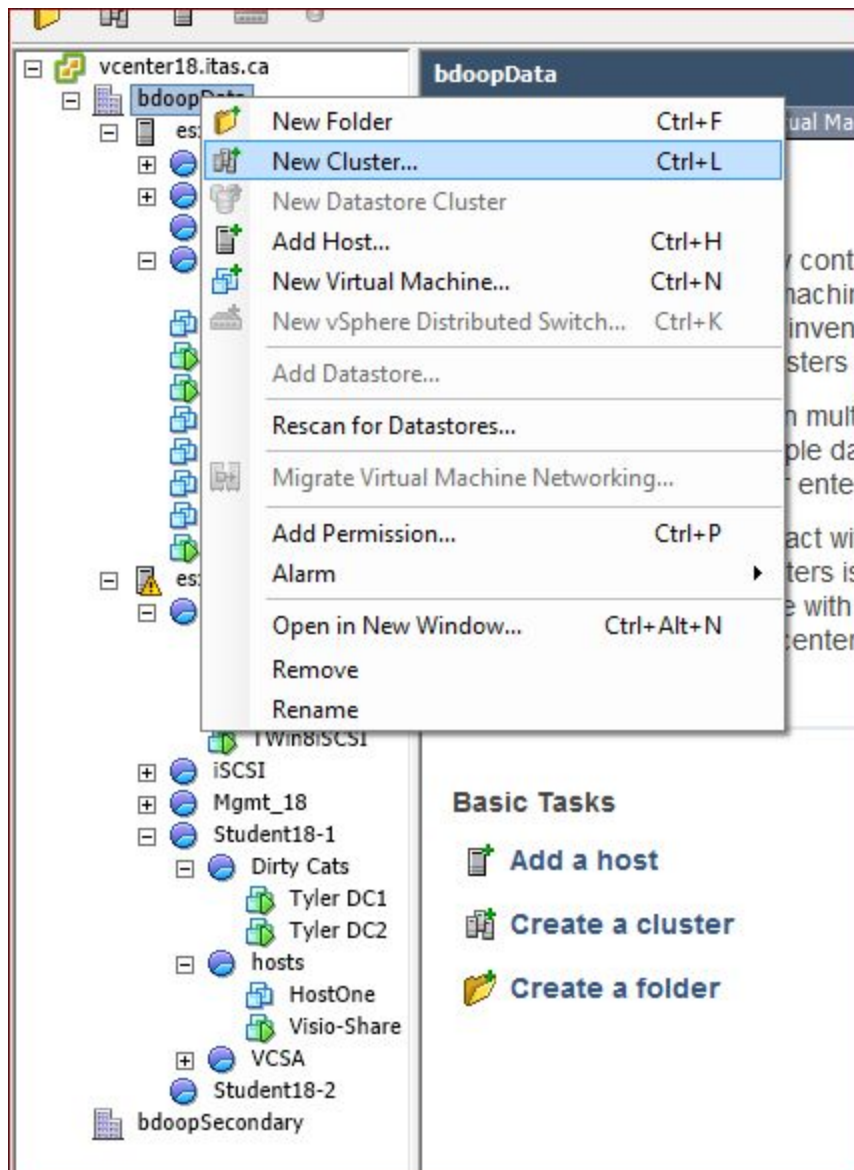
Migration Type	Change compute resource and storage
Virtual Machine	TWin8iSCSI
Host	esxi18.itas.ca
Resource Pool	Assignment_02
vMotion Priority	High
Storage	[Student18-2Datastore]
Disk Format	Same format as source

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
 - Virtual Machine Options
- vSphere HA
 - 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

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.

The screenshot shows the 'New Cluster Wizard' window with the 'vSphere DRS' section selected. The title bar reads 'New Cluster Wizard'. The main heading is 'vSphere DRS' with the question 'What level of automation do you want this cluster to use?'. On the left, a sidebar lists 'Cluster Features' with 'vSphere DRS' expanded, showing sub-options: 'Power Management', 'vSphere HA', 'Virtual Machine Options', 'VM Monitoring', 'VMware EVC', 'VM Swapfile Location', and 'Ready to Complete'. The main area is titled 'Automation level' and contains three radio button options: 'Manual' (selected), 'Partially automated', and 'Fully automated'. Each option has a descriptive text block. Below these is a 'Migration threshold' slider ranging from 'Conservative' to 'Aggressive', with a marker positioned towards the conservative side. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

New Cluster Wizard

vSphere DRS
What level of automation do you want this cluster to use?

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

Automation level

- ☒ **Manual**
vCenter will suggest migration recommendations for virtual machines.
- ☐ **Partially automated**
Virtual machines will be automatically placed onto hosts at power on and vCenter will suggest migration recommendations for virtual machines.
- ☐ **Fully automated**
Virtual machines will be automatically placed onto hosts when powered on, and will be automatically migrated to attain best use of resources.

Migration threshold: Conservative Aggressive

Apply priority 1, priority 2, and priority 3 recommendations.
vCenter will apply recommendations that promise at least good improvement to the cluster's load balance.

< Back Next > Cancel

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

New Cluster Wizard

Power Management
Do you want to enable power management for this cluster?

Cluster Features
[vSphere DRS](#)
Power Management
vSphere HA
Virtual Machine Options
VM Monitoring
VMware EVC
VM Swapfile Location
Ready to Complete

Power Management
DPM uses Wake-on-LAN, IPMI, or iLO to power on hosts. When using IPMI or iLO, configure IPMI or iLO separately for each participating host prior to enabling DPM. For all power on methods, test exit standby for each participating host prior to enabling DPM.

Specify the default power management for this cluster.

☐ **Off**
vCenter will not provide power management recommendations. Individual host overrides may be set, but will not become active until the cluster default is either Manual or Automatic.

☐ **Manual**
vCenter will recommend evacuating a host's virtual machines and powering off the host when the cluster's resource usage is low, and powering the host back on when necessary.

☒ **Automatic**
vCenter will automatically execute power management related recommendations.

DPM Threshold: Conservative Aggressive

Apply priority 3 or higher recommendations
vCenter will apply power on recommendations produced to meet vSphere HA requirements or user-specified capacity requirements. Power on recommendations will also be applied if host resource utilization becomes higher than the target utilization range. Power off recommendations will be applied if host resource utilization becomes very low in comparison to the target utilization range.

< Back **Next >** Cancel

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

The screenshot shows the 'New Cluster Wizard' window for vSphere HA configuration. The title bar reads 'New Cluster Wizard'. The main heading is 'vSphere HA' with the question 'What admission control do you want to be enforced on this cluster?'. On the left, a sidebar lists 'Cluster Features' with sub-items: 'vSphere DRS', 'vSphere HA' (selected), 'Virtual Machine Options', 'VM Monitoring', 'VMware EVC', 'VM Swapfile Location', and 'Ready to Complete'. The main content area has three sections: 1. 'Host Monitoring Status' with a description and a checked checkbox 'Enable Host Monitoring'. 2. 'Admission Control' with a description and two radio button options: 'Enable: Disallow VM power on operations that violate availability constraints' (selected) and 'Disable: Allow VM power on operations that violate availability constraints'. 3. 'Admission Control Policy' with a description and three radio button options: 'Host failures the cluster tolerates' (with a spinner set to 1), 'Percentage of cluster resources reserved as failover spare capacity' (selected, with sub-spinners for CPU and Memory both set to 25%), and 'Specify failover hosts' (with text '0 hosts specified. Click to edit.'). At the bottom are buttons for '< Back', 'Next >', and 'Cancel'.

New Cluster Wizard

vSphere HA
What admission control do you want to be enforced on this cluster?

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

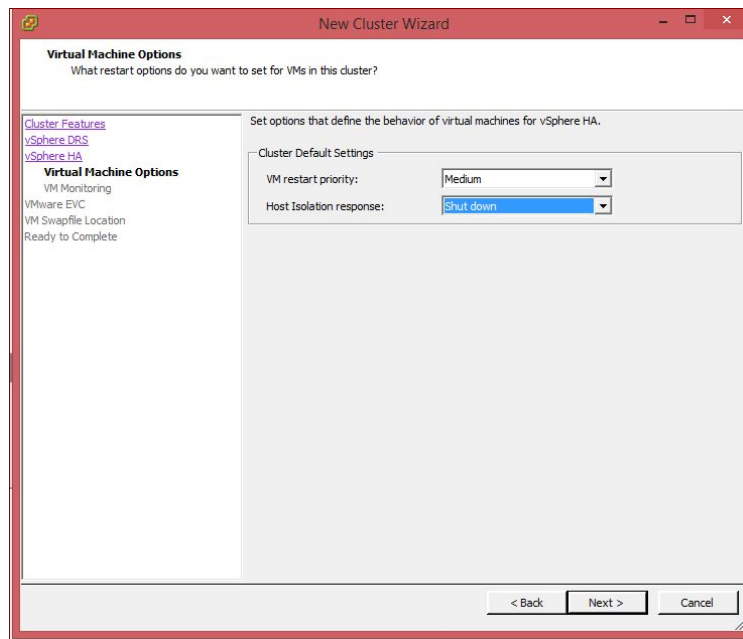
Host Monitoring Status
ESX hosts in this cluster exchange network heartbeats. Disable this feature when performing network maintenance that may cause isolation responses.
☒ Enable Host Monitoring

Admission Control
The vSphere HA Admission control policy determines the amount of cluster capacity that is reserved for VM failovers. Reserving more failover capacity allows more failures to be tolerated but reduces the number of VMs that can be run.
☒ Enable: Disallow VM power on operations that violate availability constraints
☐ Disable: Allow VM power on operations that violate availability constraints

Admission Control Policy
Specify the type of policy that admission control should enforce.
☐ Host failures the cluster tolerates: 1
☒ Percentage of cluster resources reserved as failover spare capacity:
25 % CPU
25 % Memory
☐ Specify failover hosts: 0 hosts specified. Click to edit.

< Back Next > Cancel

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.

VM Monitoring
What monitoring do you want to set on virtual machines in this cluster?

[Cluster Features](#)
[vSphere DRS](#)
[vSphere HA](#)
[Virtual Machine Options](#)
VM Monitoring
VMware EVC
VM Swapfile Location
Ready to Complete

VM Monitoring Status
VM Monitoring restarts individual VMs if their VMware tools heartbeats are not received within a set time. Application Monitoring restarts individual VMs if their VMware tools application heartbeats are not received within a set time.

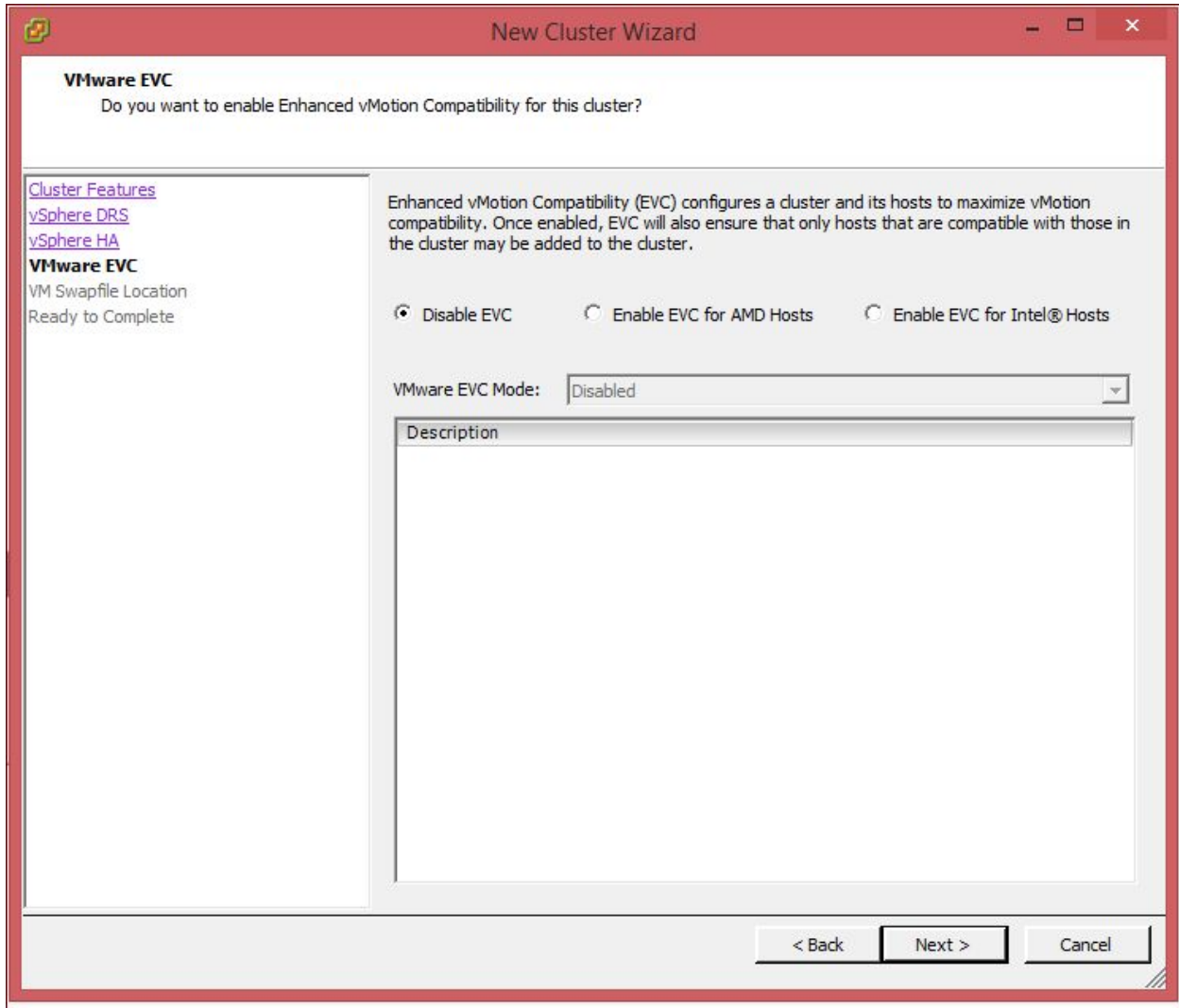
VM Monitoring: **VM Monitoring Only**

Default Cluster Settings
Monitoring sensitivity: Low High

vSphere HA will restart the VM if the heartbeat between the host and the VM has not been received within a 30 second interval. vSphere HA restarts the VM after each of the first 3 failures every hour.

< Back Next > Cancel

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.



The image shows a screenshot of the 'New Cluster Wizard' window, specifically the 'VMware EVC' configuration step. The window has a red title bar with the text 'New Cluster Wizard'. Inside, the main heading is 'VMware EVC' with the question 'Do you want to enable Enhanced vMotion Compatibility for this cluster?'. On the left, there is a sidebar with links: 'Cluster Features', 'vSphere DRS', 'vSphere HA', and 'VMware EVC'. Below these links, it says 'VM Swapfile Location' and 'Ready to Complete'. The main area contains a description of EVC: 'Enhanced vMotion Compatibility (EVC) configures a cluster and its hosts to maximize vMotion compatibility. Once enabled, EVC will also ensure that only hosts that are compatible with those in the cluster may be added to the cluster.' Below this description are three radio buttons: 'Disable EVC' (which is selected), 'Enable EVC for AMD Hosts', and 'Enable EVC for Intel® Hosts'. Below the radio buttons is a dropdown menu labeled 'VMware EVC Mode:' with 'Disabled' selected. At the bottom right, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is highlighted with a black border.

VMware EVC
Do you want to enable Enhanced vMotion Compatibility for this cluster?

[Cluster Features](#)
[vSphere DRS](#)
[vSphere HA](#)
VMware EVC
VM Swapfile Location
Ready to Complete

Enhanced vMotion Compatibility (EVC) configures a cluster and its hosts to maximize vMotion compatibility. Once enabled, EVC will also ensure that only hosts that are compatible with those in the cluster may be added to the cluster.

☒ Disable EVC ☐ Enable EVC for AMD Hosts ☐ Enable EVC for Intel® Hosts

VMware EVC Mode: Disabled

Description

< Back **Next >** Cancel

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**.

New Cluster Wizard

Ready to Complete
Review the selected options for this cluster and click Finish.

[Cluster Features](#)
[vSphere DRS](#)
[vSphere HA](#)
[VMware EVC](#)
[VM Swapfile Location](#)
Ready to Complete

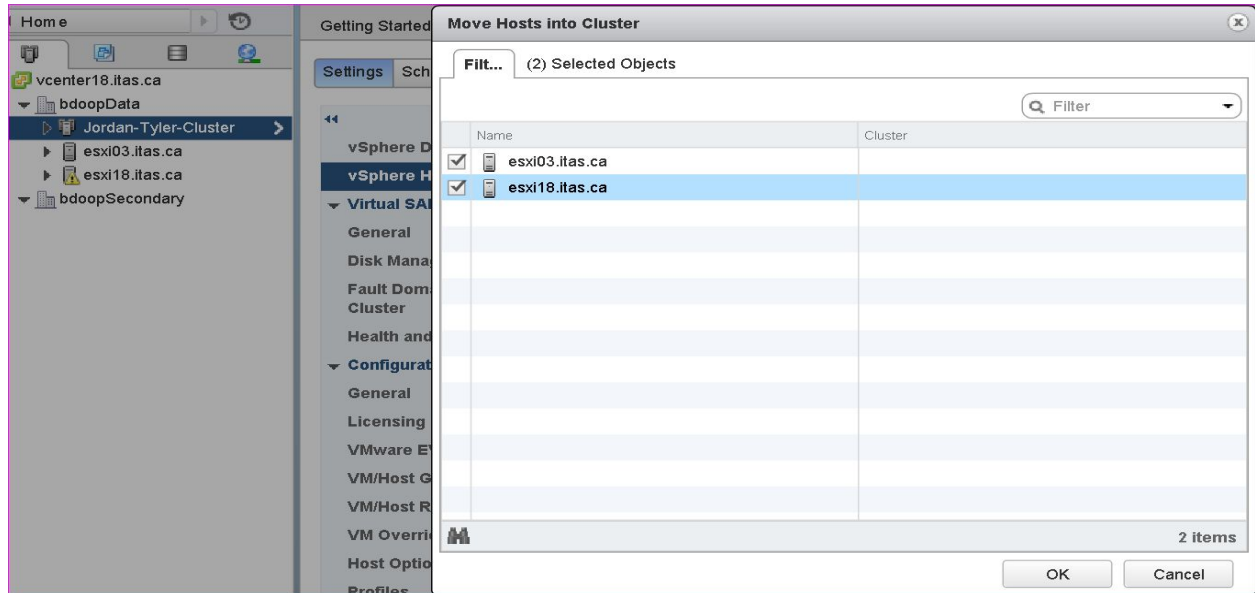
The cluster will be created with the following options:

Cluster Name:	Jordan-Tyler-Cluster
vSphere DRS:	Enabled
vSphere DRS Automation Level:	Fully Automated
vSphere DRS Migration Threshold:	Apply priority 1, priority 2, and priority 3 recommendations.
Power Management:	Enabled
Power Management Automation Level:	Automated
Power Management Threshold:	Apply priority 3 or higher recommendations
vSphere HA Host Monitoring:	Running
Admission Control:	Enabled
Admission Control Policy:	Number of host failures cluster tolerates
Host Failures Allowed:	1
VM Restart Priority:	Medium
Host Isolation Response:	Shut down
vSphere HA VM Monitoring:	VM and Application Monitoring
Monitoring Sensitivity:	High
VMware EVC Mode:	Disabled
Virtual Machine Swapfile Location:	Same directory as the virtual machine

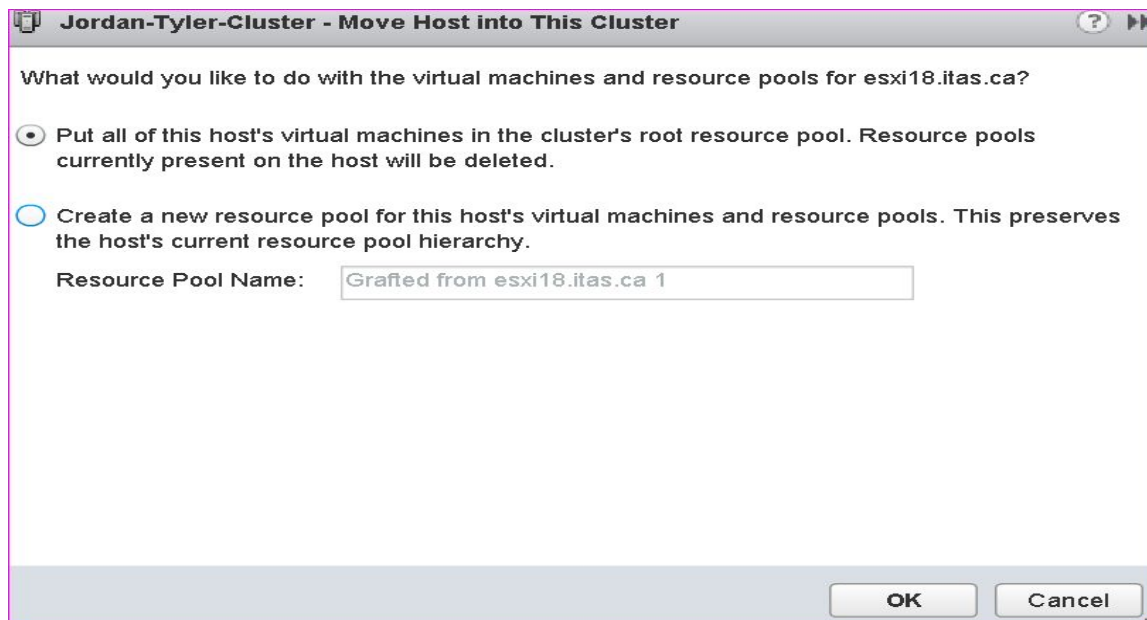
< Back Finish Cancel

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.

The screenshot shows the 'Edit Cluster Settings' window for the 'Jordan-Tyler-Cluster'. The left sidebar has 'vSphere DRS' and 'vSphere HA' tabs, with 'vSphere HA' selected. The main area contains several sections with checkboxes and expandable details.

Turn on vSphere HA ☒

Host Monitoring
ESX/ESXi hosts in this cluster exchange network heartbeats. Disable this feature when performing network maintenance that might cause isolation responses.
☒ Host Monitoring

Host Hardware Monitoring - VM Component Protection
ESX/ESXi hosts have the capability to detect various failures that do not necessarily cause virtual machines to go down, but could deem them unusable (for example, losing network/disk communication)
☒ Protect against Storage Connectivity Loss

Virtual Machine Monitoring
VM Monitoring restarts individual VMs if their VMware Tools heartbeats are not received within a set time. Application Monitoring restarts individual VMs if their in-guest application heartbeats are not received within a set time.
VM and Application Monitoring:

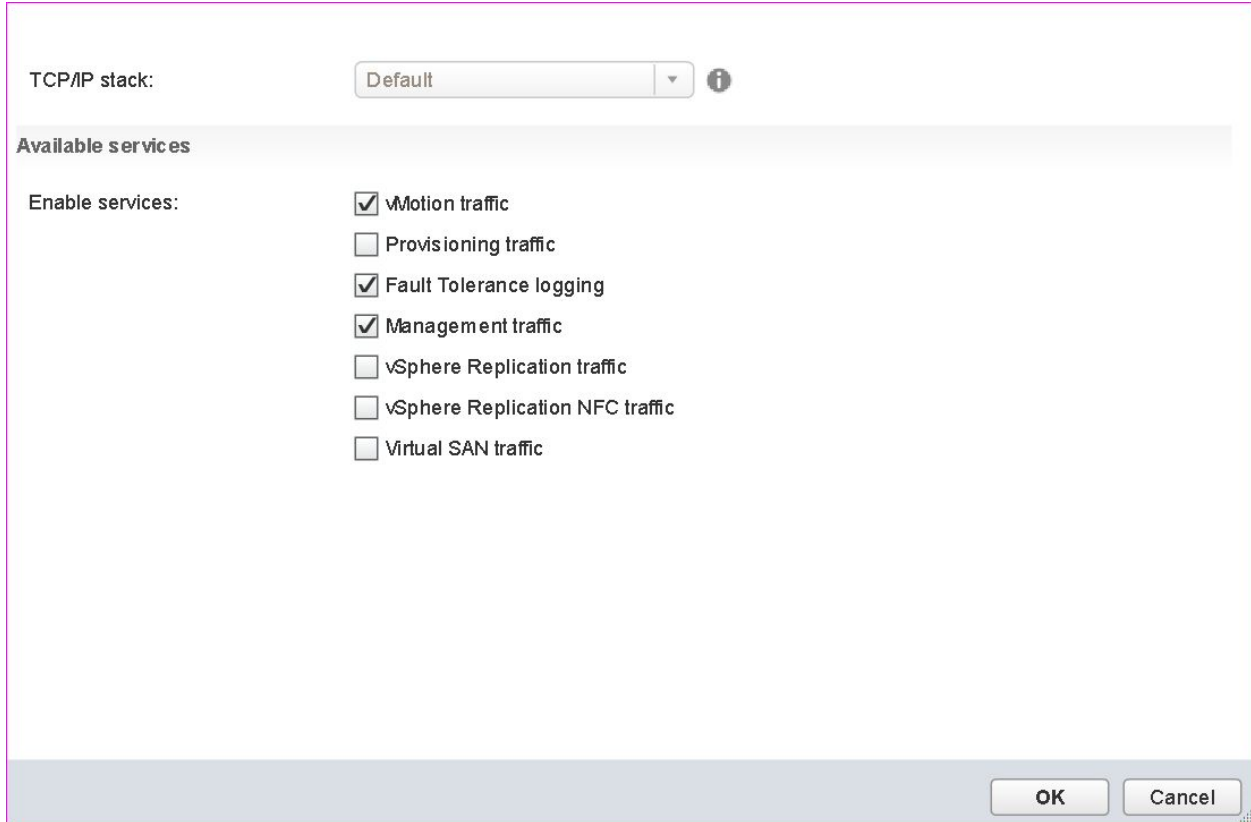
▶ Failure conditions and VM response	Expand for details
▶ Admission Control	Expand for details
▶ Datastore for Heartbeating	Expand for details
▶ Advanced Options	None

At the bottom right are 'OK' and 'Cancel' buttons.

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**.



TCP/IP stack: Default ⓘ

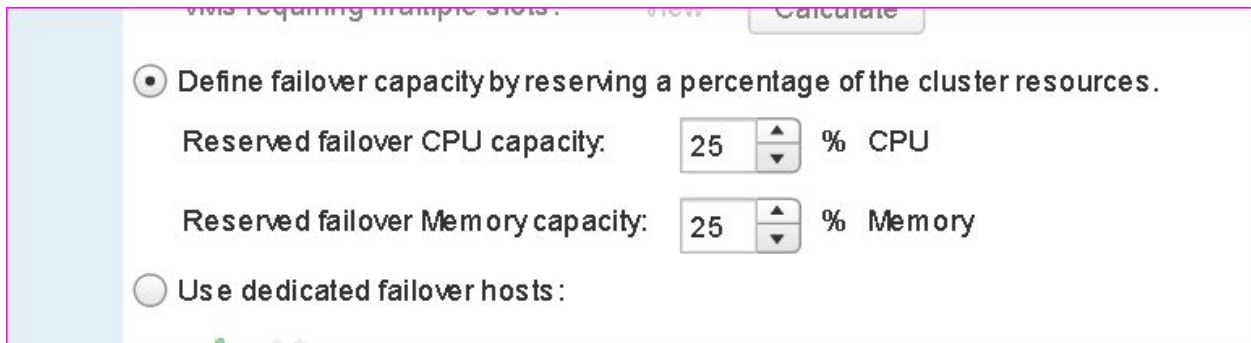
Available services

Enable services:

- ☒ VMotion traffic
- ☐ Provisioning traffic
- ☒ Fault Tolerance logging
- ☒ Management traffic
- ☐ vSphere Replication traffic
- ☐ vSphere Replication NFC traffic
- ☐ Virtual SAN traffic

OK **Cancel**

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.



...vms requiring multiple slots. view Calculate

☒ Define failover capacity by reserving a percentage of the cluster resources.

Reserved failover CPU capacity: 25 ▲▼ % CPU

Reserved failover Memory capacity: 25 ▲▼ % Memory

☐ Use dedicated failover hosts:

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

Datastore for Heartbeating

vSphere HA uses datastores to monitor hosts and virtual machines when management network has failed. vCenter Server selects two datastores for each host using the policy and datastore preferences specified below.

Heartbeat datastore selection policy:

- ☐ Automatically select datastores accessible from the host
- ☐ Use datastores only from the specified list
- ☒ Use datastores from the specified list and complement automatically if needed

Available heartbeat datastores

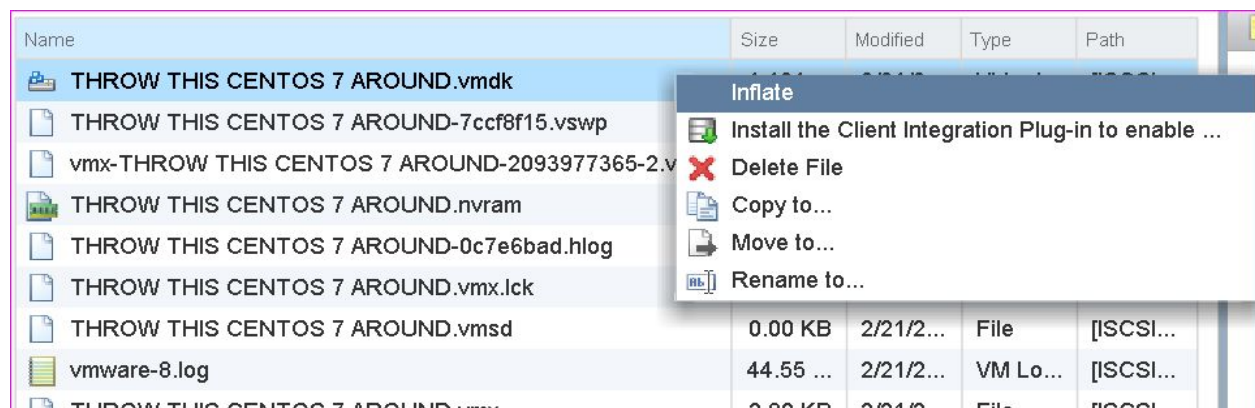
	Name	Datastore Cluster	Hosts Mounting Datastore
<input checked="" type="checkbox"/>	ISCSI	N/A	2
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

Hosts mounting selected datastore

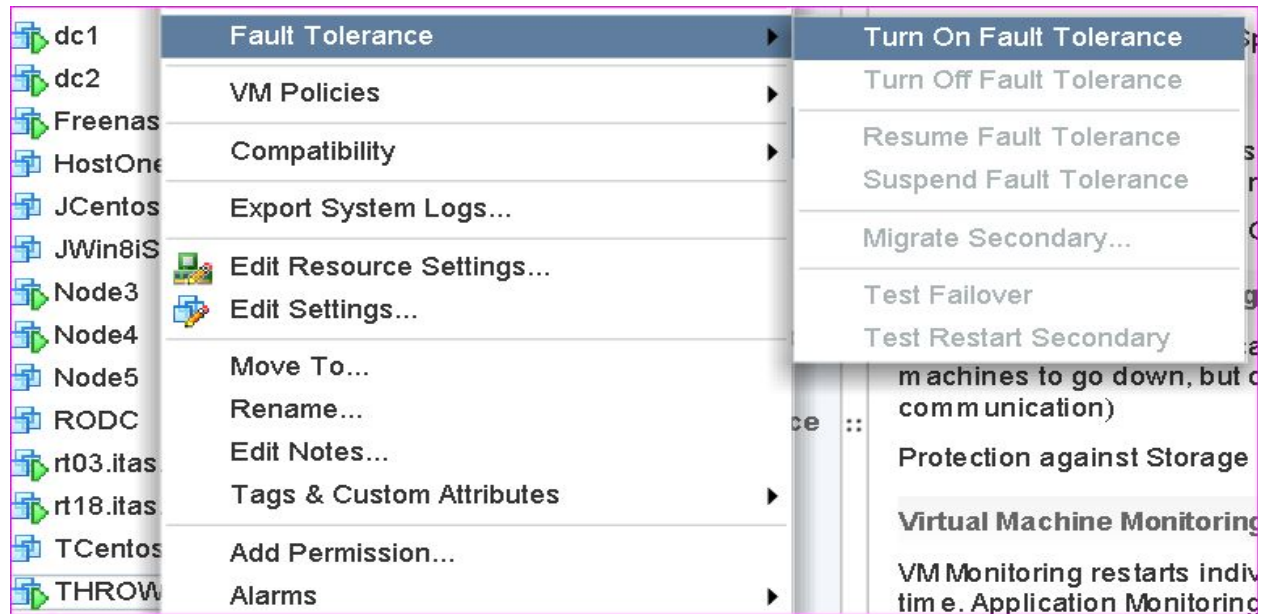
Name
esxi18.itas.ca
esxi03.itas.ca

OK **Cancel**

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.

[illegible]

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


Filter


Filter

Name	1 ▲	State	Status	HA State
 esxi03.itas.ca		Connected	 Warning	 Connected (Slave)
 esxi18.itas.ca	<input checked="" type="radio"/>	Connected	 Warning	 Running (Master)

2 Objects

Compatibility:

 The Fault Tolerance configuration of the entity esxi18.itas.ca has an issue: "The virtual NIC associated with the host has insufficient bandwidth for vSphere Fault Tolerance logging".

 Datastore ISCSI is being used for both primary and secondary VM's disks, which is not recommended

Back

Next

Finish

Cancel

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

Placement details for the Secondary VM

Host:

esxi18.itas.ca

Configuration File Location:

ISCSI

Tie Breaker File Location:

ISCSI

Hard disk 1 Location:

ISCSI

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.

<input checked="" type="checkbox"/> Turn ON vSphere DRS	
▶ DRS Automation	Manual ▼
▶ Power Management	Automatic ▼
▶ Advanced Options	None

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

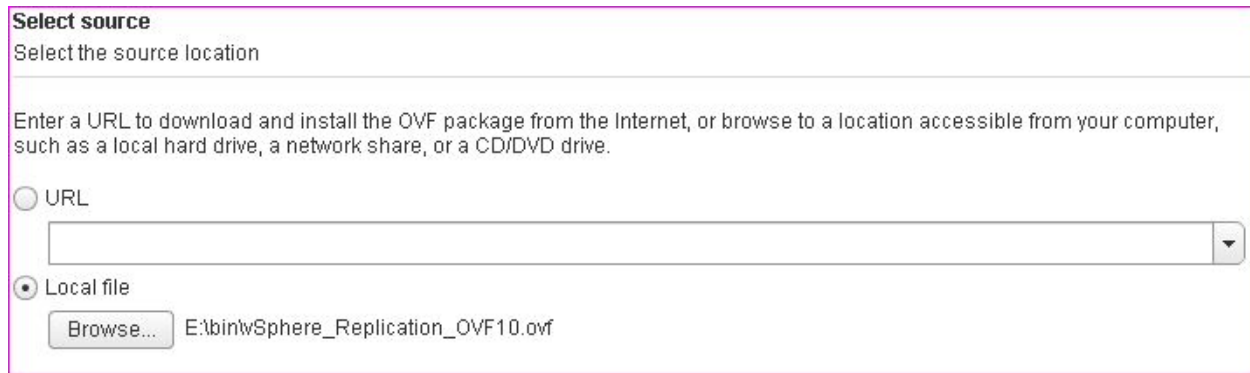
vSphere Replication Experiment

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**.



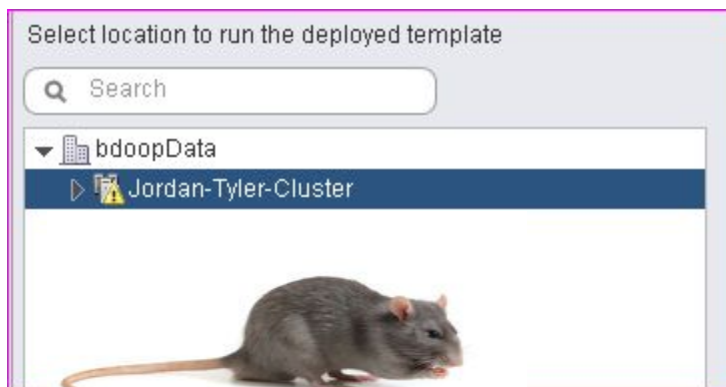
On the next page review the details of the product and click **Next**.

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**.

Select storage
Select location to store the files for the deployed template

Select virtual disk format:

VM Storage Policy: ⓘ

The following datastores are accessible from the destination resource that you selected. Select the destination datastore for the virtual machine configuration files and all of the virtual disks.


Name	Capacity	Provisioned	Free	Type	Storage DRS
 Student03-2Datastore	447.00 GB	465.58 GB	322.13 GB	VMFS	
 Student18-1Datastore	447.00 GB	379.58 GB	242.88 GB	VMFS	
 MgmtDatastore_18	216.00 GB	40.14 GB	178.02 GB	VMFS	
 ISCSI	249.75 GB	95.22 GB	171.39 GB	VMFS	
 Student03-1Datastore	447.00 GB	547.76 GB	148.57 GB	VMFS	
 Student18-2Datastore	447.00 GB	459.12 GB	135.55 GB	VMFS	
 MgmtDatastore_03	104.25 GB	25.26 GB	80.15 GB	VMFS	

◀ :: ▶

Back Next Finish Cancel

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**.

Setup networks
Configure the networks the deployed template should use

Source	Destination	Configuration
Management Network	<input type="text" value="External2"/>	

IP protocol: IP allocation: ⓘ

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**.

Customize template
Customize the deployment properties of this software solution

All properties have valid values

Show next...Collapse all...

▼ Application	2 settings
Password	The password for the appliance 'root' account. Enter password <input type="password" value="*****"/> Confirm password <input type="password" value="*****"/>
NTP Servers	A comma-separated list of hostnames or IP addresses of NTP Servers. <input type="text" value="ntp.itas.ca"/>

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.

Ready to complete
Review your settings selections before finishing the wizard.

OVF file	E:\bin\vsphere_Replication_OVF10.ovf
Download size	1.1 GB
Size on disk	2.4 GB
Name	vsphere Replication Appliance
Deployment configuration	4 vCPU
Target	Jordan-Tyler-Cluster
Datastore	Student03-2Datastore
Folder	bdoopSecondary
Disk storage	Thin Provision
Network mapping	Management Network to External2
IP allocation	DHCP, IPv4
Properties	NTP Servers = ntp.itas.ca
vService dependency mapping	'vCenter Extension Installation' bound to provider 'vCenter Extension vService'.

☒ Power on after deployment

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

```
vSphere Replication Appliance - 6.1.2.16016 Build 7026558
To manage this VM browse to https://10.104.142.171:5480/
```

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**.

Target location
Select a datastore where the replicated files will be stored.

▶  TCentosiSCSI [\(info\)](#)

Target VM location: **[Student05-1Datastore] TCentosiSCSI**
VM storage policy: **Datastore Default**

Edit...

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.

Recovery settings
Configure recovery settings for the virtual machine.

Recovery Point Objective (RPO)
Lower RPO times reduce potential data loss, but use more bandwidth and system resources.
5 minutes RPO is supported under special conditions ([learn more](#)).

15 minutes



24 hours

15 minutes

Point in time instances
Retained replication instances are converted to snapshots during recovery. Replication of existing VM snapshots is not supported.

☒ Enable

Keep instances per day for the last days (9 total)

If the RPO period is longer than 8 hours, you might want to decrease the RPO value to allow vSphere Replication to create the number of instances that you want to keep.

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

The screenshot shows a wizard window titled "Configure Replication for Centos7". On the left is a sidebar with seven steps, each with a green checkmark: 1 Replication type, 2 Target site, 3 Replication server, 4 Target location, 5 Replication options, 6 Recovery settings, and 7 Ready to complete (which is highlighted with a blue background). The main area is titled "Ready to complete" and contains the text "Review your settings selections before finishing the wizard." Below this is a warning icon and text: "This virtual machine is not powered on. Replication will start when the virtual machine is powered on." The settings are organized into two sections: "Replication settings" and "Recovery settings".

Replication settings	
Target site name:	vcenter08.itas.ca
Replication server:	vSphere Replication Appliance (Embedded)
VM Storage Policy:	Datastore Default
Target location:	[Student05-1Datastore] Centos7
Replicated disks:	1 of 1
Disks with customized settings:	0 of 1
Disks with seeds:	0 of 1
Quiescing:	Disabled
Network compression:	Disabled

Recovery settings	
RPO:	15 minutes
Points in time recovery:	Enabled
Instances for recovery:	Keep 3 instances per day for the last 3 days

At the bottom right of the window are four buttons: "Back", "Next", "Finish", and "Cancel".

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 100GB.

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.

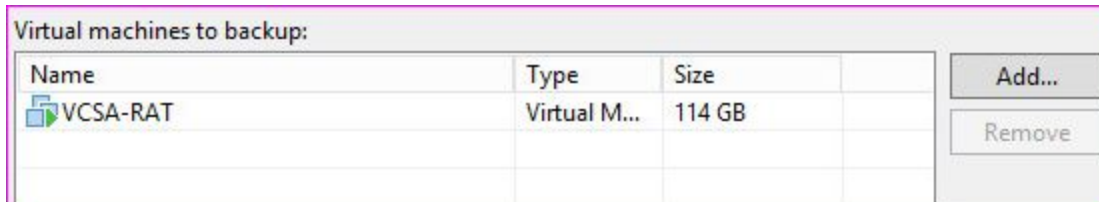
On the next page "**Credentials**" click **Add** and type in the username and password of the ESXI server and click **Ok**, then **Next**. If it prompts you with a Security Warning click **Connect**.

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**.



Name	Type	Size
VCSA-RAT	Virtual M...	114 GB

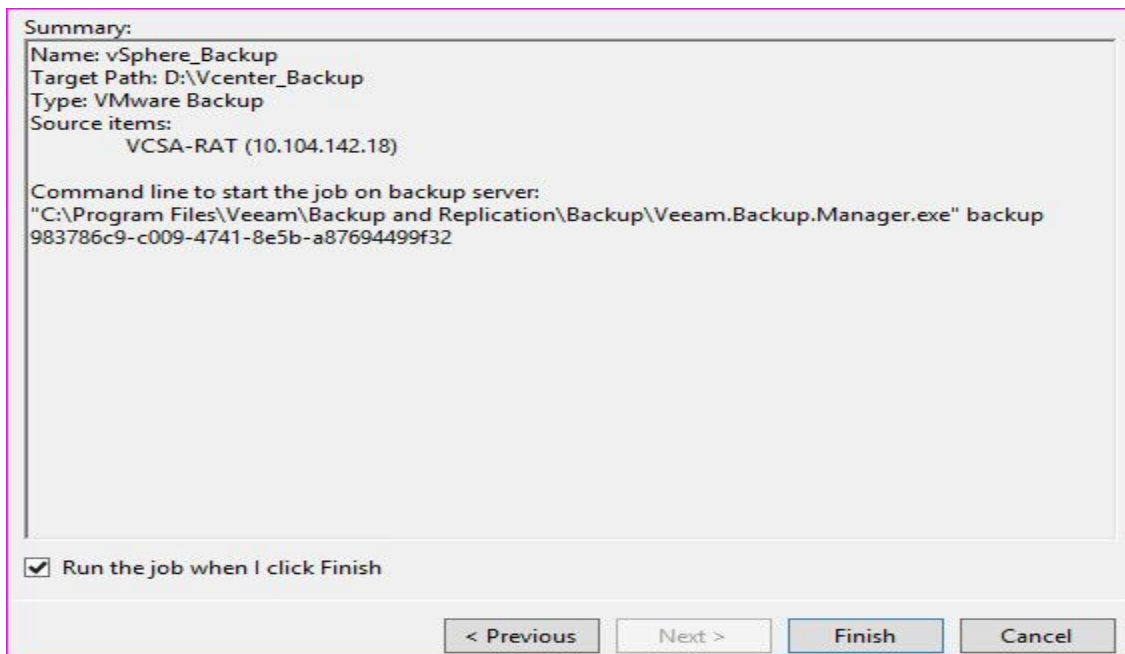
Buttons: Add..., Remove

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)

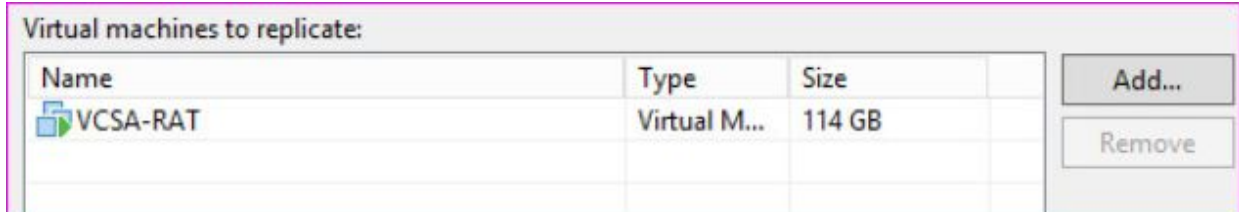
Command line to start the job on backup server:
"C:\Program Files\Veeam\Backup and Replication\Backup\Veeam.Backup.Manager.exe" backup 983786c9-c009-4741-8e5b-a87694499f32


☒ Run the job when I click Finish

Buttons: < 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**.



Name	Type	Size
 VCSA-RAT	Virtual M...	114 GB

Add...
Remove

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**.



Host or cluster:
10.104.142.03 Choose...

Resource pool:
Resources Choose...

VM folder:
vm Choose...

Datastore:
Student03-2Datastore [318.8 GB free] Choose...

[Pick datastore](#) for selected virtual disks

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**.

The screenshot shows the 'Schedule' configuration window for a VMware backup job. The 'Run the job automatically' checkbox is checked. Under this section, the 'Periodically every' radio button is selected, with a value of '15' minutes. The 'Automatic retry' section has 'Retry failed items processing' checked and set to '3' times, with a wait time of '10' minutes before each attempt. The 'Backup window' section has 'Terminate job if it exceeds allowed backup window' unchecked. At the bottom, the 'Apply' button is highlighted.

☒ Run the job automatically

☐ Daily at this time: 10:00 PM Everyday Days...

☐ Monthly at this time: 10:00 PM Fourth Saturday Months...

☒ Periodically every: 15 Minutes Schedule...

☐ After this job: vSphere_Backup (Created by WIN-VIEEU8KV4G0\Administrator at 3/5/2)

Automatic retry

☒ Retry failed items processing: 3 times

Wait before each retry attempt for: 10 minutes

Backup window

☐ Terminate job if it exceeds allowed backup window Window...

If the job does not complete within allocated backup window, it will be terminated to prevent snapshot commit during production hours.

< Previous Apply Finish Cancel

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_eKo66PZAUNwWMKHdutDRAQ_AUICigB&biw=1280&bih=649
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- 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>