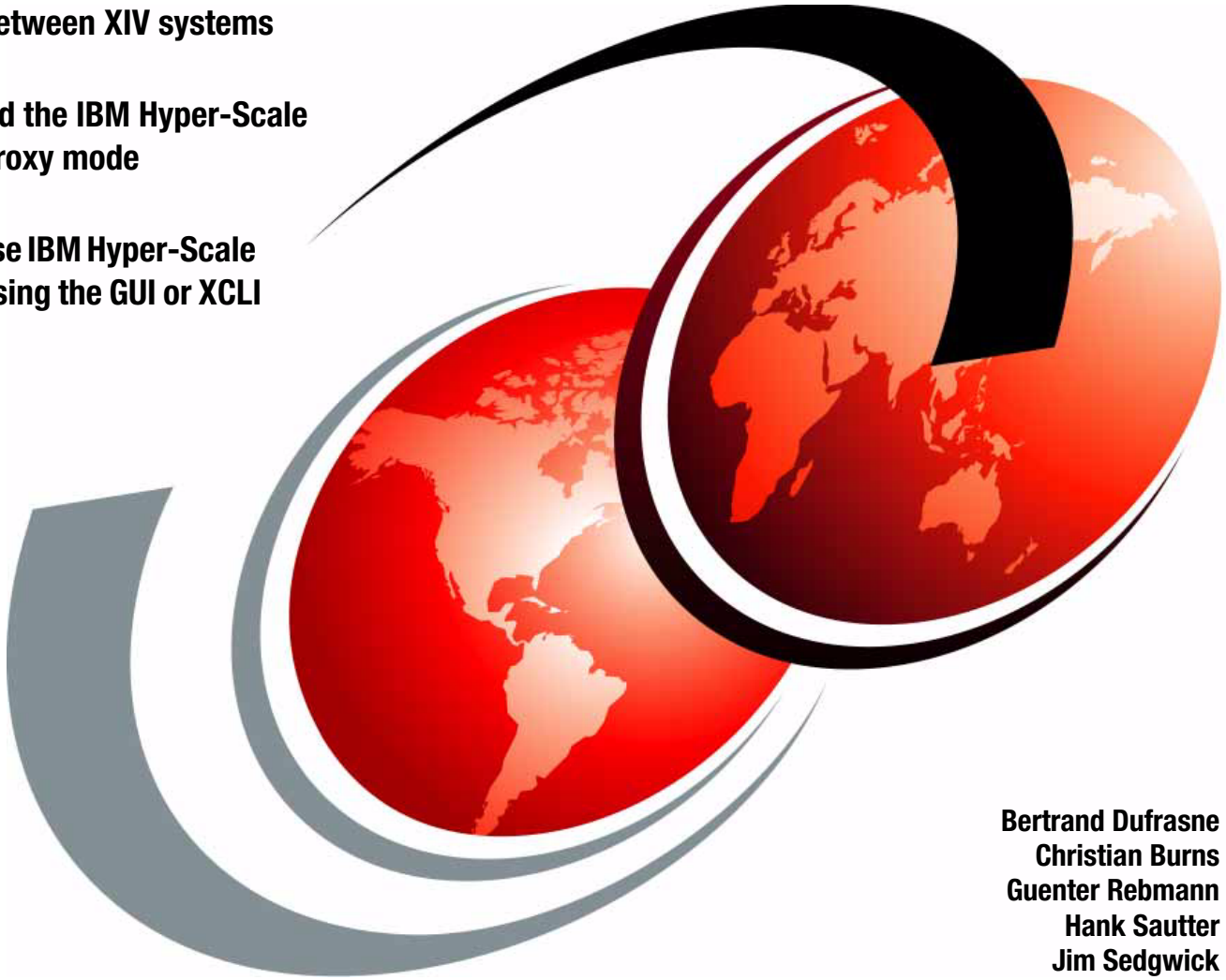
IBM XIV Storage System

IBM Hyper-Scale Mobility Overview and Usage

- Benefit from nondisruptive data mobility between XIV systems
- Understand the IBM Hyper-Scale Mobility Proxy mode
- Learn to use IBM Hyper-Scale Mobility using the GUI or XCLI



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IBM XIV Storage System: IBM Hyper-Scale Mobility Overview and Usage

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Note: Before using this information and the product it supports, read the information in “Notices” on page v.

First Edition (June 2013)

This edition applies to Version 11.3 of the IBM XIV Storage System Software.

Note: This book is based on a pre-GA version of a product and may not apply when the product becomes generally available. We recommend that you consult the product documentation or follow-on versions of this IBM Redpaper publication for more current information.

Contents

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Preface

IBM® Hyper-Scale introduces two major new technologies, both implemented in the IBM XIV® Storage System (Gen3 models):

- The first is IBM Hyper-Scale Manager, a flexible, consolidated multi-system management application that was originally released in October 2012 as “Multi-System Manager”. IBM Hyper-Scale Manager is based on and seamlessly integrated with the XIV GUI and spans multiple XIV systems.
- The second new technology, IBM Hyper-Scale Mobility, is the topic of this publication. It is a powerful function for moving volumes between storage containers transparently, with no disruption to host applications.

IBM Hyper-Scale helps you easily overcome provisioning scenarios that normally challenge traditional systems. IBM Hyper-Scale can accommodate several critical customer scenarios for data mobility, load balancing, over-provisioning, and storage system repurposing.

This IBM Redpaper™ publication provides a broad understanding of the IBM Hyper-Scale Mobility feature. The paper describes the IBM Hyper-Scale architecture and includes detailed step by step scenarios that illustrate the online volume migration process, both from the XIV GUI and the XIV Command-Line Interface (XCLI).

This publication is intended for XIV customers and users who want a practical understanding of IBM Hyper-Scale Mobility concepts and usage.

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1

IBM Hyper-Scale Mobility architecture and design

IBM Hyper-Scale introduces two major new technologies, both implemented in the IBM XIV Storage System (Gen3 models):

- The first is IBM Hyper-Scale Manager, a flexible, consolidated multi-system management application that was originally released in October 2012 as “Multi-System Manager”. IBM Hyper-Scale Manager is based on and seamlessly integrated with the XIV GUI and spans multiple XIV systems.
- The second new technology, IBM Hyper-Scale Mobility, is the topic of this publication. It is a powerful function for moving volumes between storage containers transparently, with no disruption to host applications.

This chapter provides, a general description of the IBM Hyper-Scale Mobility feature and its architecture and design.

1.1 Introduction to IBM Hyper-Scale Mobility

Introduced with the XIV Storage System Software V11.3, IBM Hyper-Scale Mobility is a feature of the XIV system. IBM Hyper-Scale Mobility allows customers to move a volume from one XIV Gen3 system to another (within the same physical site) in a manner that is transparent to host applications before, during, and after the volume migration. IBM Hyper-Scale Mobility, like all XIV software features, is included in the XIV base software.

No-charge: IBM Hyper-Scale Mobility is a no-charge feature that is included with XIV Storage System Software V11.3.

IBM Hyper-Scale Mobility helps you overcome provisioning scenarios that normally challenge traditional systems. It can accommodate several critical customer needs in the modern data center and cloud environment, including online data mobility, load balancing, over-provisioning, and storage system repurposing.

This volume migration capability greatly enhances XIV scalability and directly addresses several customer storage-related issues:

- Managing storage growth
- Allowing more flexibility in capacity forecasting
- Managing costs
- Dealing with storage performance problems

IBM Hyper-Scale Mobility capabilities also provide the XIV Storage System with an even better total cost of ownership (TCO) position and improved service continuity.

IBM Hyper-Scale allows the following actions:

- Balancing workloads across systems without service downtime for better performance
- The graceful retirement of systems and upgrading to the latest XIV technology
- Detaching storage and host maintenance cycles

Consider how IBM Hyper-Scale Mobility can address the following customer situations:

- XIV Storage System online volume migration is useful when combined with XIV Storage System thin provisioning.

  When an XIV Storage System is overprovisioned and the total system hard space is approaching system-wide depletion, Hyper-Scale provides a way to move volumes to another system, thus freeing up needed hard pool space.

  Alternatively, the volumes in the XIV thin pool that are unexpectedly using more hard space than planned can be moved to an XIV Storage System with plenty of hard pool space, with no impact to the application host severs.
- IBM Hyper-Scale Mobility is equally useful in a regularly provisioned XIV Storage System that is simply running out of physical storage space.
- Volume migration using Hyper-Scale can be used in a situation where a customer has two XIV Storage System systems with different performance characteristics. For example, if an application that was on a 12 module XIV Storage System configuration needs more performance capacity, Hyper-Scale can be used to move those volumes to a 15 module XIV Storage System with solid-state drives (SSDs).
- IBM Hyper-Scale Mobility can also be used to simply rebalance the workload away from a system that is heavily used to a system that is under utilized. It does not matter if the capacity imbalance was performance or data storage related; IBM Hyper-Scale Mobility can help resolve both situations.

1.2 IBM Hyper-Scale Mobility design considerations

IBM Hyper-Scale Mobility is designed to provide a process to move volumes between IBM XIV Storage Systems with little host impact. Moving volumes usually requires defining a volume on the destination (or target) XIV Storage System, migrating data, and disrupting host applications while the new volume is activated. The IBM Hyper-Scale Mobility architecture allows these basic steps to be completed with minimum host involvement and no disruption to host applications.

The objective is to move the data to a new volume that is on another XIV Gen3 Storage System while allowing the host to view this new volume as though it is the original. This task is accomplished by redirecting I/O activity automatically (proxy) from the source XIV Storage System to the destination XIV Storage System without needing changes to the host configuration. The new volume must look to the host as though it is the original, which is accomplished by duplicating the volume characteristics of the original volume (for example, the worldwide name of the two volumes are identical).

The final steps of the migration require some host intervention to establish paths directly to the new volume and to remove the paths to the original volume. This task, however, should not significantly disrupt host application activity; the host I/Os never need to be interrupted during the whole migration process.

For a detailed, step by step illustration of the online migration process using either the XIV GUI or the XCLI, see Chapter 2, “Using IBM Hyper-Scale Mobility” on page 7.

1.3 IBM Hyper-Scale Mobility requirements

The integration of IBM Hyper-Scale Mobility in the XIV Storage System provides initial support for hosts that are running IBM AIX®, Linux, and various Windows Server versions.

To cause minimal disruption to the host and allow uninterrupted I/O operations, several requirements must be met:

- Multi-path driver

  The process of moving a volume concurrently with host access requires that the host operating system uses a multi-path driver to access the volume that is being moved.

  During the migration, new paths are added and the old paths to the original volume eventually are removed.

- Switch zoning

  The source and the destination XIV systems must be accessible to the host system concurrently. This might require changes to the zoning in use by the host that is involved. The two XIV Storage System systems also need zoning to allow connections for data migration.

- IBM XIV Storage System systems

  Obviously, there must be two XIV systems, one being the source and the other the destination.

  The new volume is automatically created on the destination system in a specified storage pool, so sufficient space must be available for this action. Consideration should also be given for any possible increase in snapshot space that might be required on the destination system.

1.4 IBM Hyper-Scale Mobility process description

From a design standpoint, the IBM Hyper-Scale Mobility process that is used to move a volume between XIV systems can be summarized in a sequence of stages that is characterized by phases and the corresponding states of the migrated volume. The phases and states are depicted in Figure 1-1.

Volume mobility between the source system and the destination system does not interrupt host activity and is not disrupted by rebuild, redistribution, phase-out, or failover on the destination.

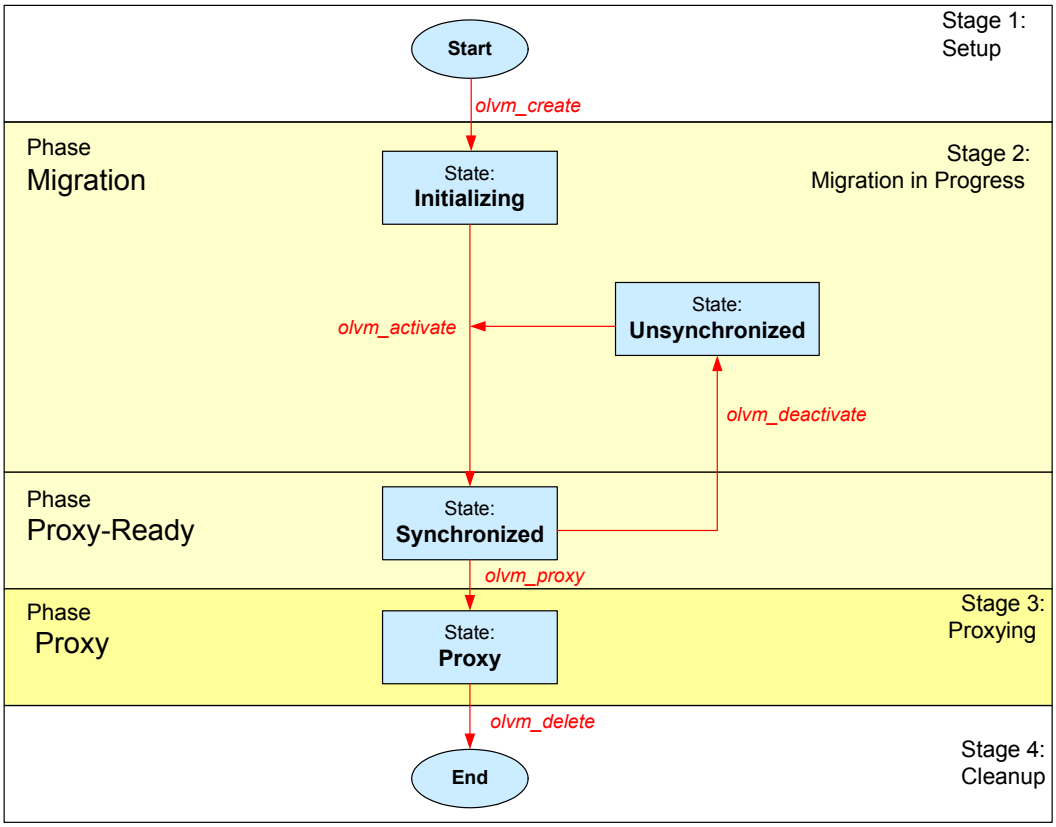

Figure 1-1 IBM Hyper-Scale Mobility flow diagram

Stage 1: Setup

The first stage of the IBM Hyper-Scale Mobility is to create the volume on the destination XIV Storage System and set up the relationship between the two volumes that are needed for migration by running the **`olvm_create`** command.

Stage 2: Migration in progress

Data migration can begin (by running the **`olvm_activate`** command) and must complete successfully before the host can access the new volume. This is part of the Migration phase. During migration, new data is written by the host to the source and migrated (copied) to the destination.

The source volume state goes from initializing to synchronized if the migration is successful (Proxy_ready phase). The source volume can enter the unsynchronized state if there is a link disruption or deactivation. You can set it to this state by running **`olvm_deactivate`**.

Stage 3: Proxying

At this point, the administrator can instruct the source storage system to redirect host I/O to the new volume on the destination storage system by running **`olvm_proxy`**. This stage corresponds to the Proxy phase.

In proxy mode, the source (now the proxy) no longer functions as a regular volume, and the source storage system communicates host requests to the destination. Now, the migration is no longer reversible.

In proxy mode, the host can remain connected to the source without a need to zone and move it to the destination; the host can be moved after the migrated volume data is on the destination.

Stage 4: Cleanup

The final stage of the migration involves connecting the host directly to the new volume. This stage might require zoning changes, and the multi-path device driver must discover the new path to the migrated volume.

Finally, the original paths can be removed and the IBM Hyper-Scale Mobility relationship can be deleted by running **`olvm_delete`**.

2

Using IBM Hyper-Scale Mobility

This chapter serves as a practical guide to using IBM Hyper-Scale Mobility, a feature of the XIV Storage System Software V11.3.

The chapter outlines the prerequisites and conditions of usage for IBM Hyper-Scale Mobility. It highlights functions of both the GUI and XCLI, which support IBM Hyper-Scale Mobility, and then provides step-by-step illustrated examples.

Note: The screen captures that are shown in this chapter were created by using the pre-release code of the XIV software and GUI that was available at the time of the writing of this paper, and might differ from the software and GUI that you see in the released version.

2.1 Usage prerequisites and considerations

In addition to the general requirements for using IBM Hyper-Scale Mobility that are given in 1.3, “IBM Hyper-Scale Mobility requirements” on page 3, there are additional prerequisites and considerations.

2.1.1 Volume and storage pool considerations

There are specific considerations and conditions regarding volume and storage pools selection when you use IBM Hyper-Scale Mobility:

- Volumes that are already part of a mirroring relationship cannot be selected as the source volume with IBM Hyper-Scale Mobility.
- Volumes that are already part of a consistency group cannot be selected as the source volume with IBM Hyper-Scale Mobility.
- Any snapshots that exist on a volume are *deleted* when the IBM Hyper-Scale Mobility process is moved to the Proxy phase.
- The destination storage pool for an IBM Hyper-Scale Mobility relationship must contain enough free space to accommodate the destination volume. Consideration should also be given for any possible increase in snapshot space that might be required on the target system.

2.1.2 Management workstation connectivity

To perform the online migration of an XIV volume by using the GUI or XCLI, you must verify that both the source and destination XIV Storage System systems are configured and accessible by the GUI or XCLI.

2.1.3 Connectivity between the source and destination XIV systems

To effectively use IBM Hyper-Scale Mobility, there must be adequate connectivity between the source and destination XIV Storage System systems.

The IBM Hyper-Scale Mobility process uses the same mechanism to synchronize source and destination volumes as Remote Mirroring. Fundamentally, IBM Hyper-Scale Mobility acts much like synchronous Remote Mirroring during the migration and proxy-ready phases.

When you plan IBM Hyper-Scale Mobility activities, you can follow the same guidelines and best practices regarding connectivity between source and destination XIV Storage System systems as those followed with synchronous Remote Mirroring. For more information, see Chapter 3, “Remote mirroring”, and Chapter 4, “Synchronous remote mirroring”, in *IBM XIV Storage System: Copy Services and Migration*, SG24-7759.

Note, however, that as made available with Version 11.3 of the IBM XIV Storage System Software, the IBM Hyper-Scale Mobility restricts the source and target XIV systems to be located at short distance from each other (that is, within the same physical site). Also, the two systems must be connected over Fibre Channel (iSCSI is not supported at this time).

2.1.4 Host system connectivity

Before you use IBM Hyper-Scale Mobility, you must confirm that any host that has mappings to the source volume on the source XIV Storage System has the appropriate access to the destination XIV Storage System:

- If you are migrating an iSCSI LUN, ensure that the host can access the destination system over the IP network.
- If you are migrating an FC LUN, ensure that the host is correctly zoned to the destination system.

2.2 Management software support for IBM Hyper-Scale Mobility

XIV System Management Software V4.2 introduces support for the IBM Hyper-Scale Mobility feature through both the GUI and XCLI. Either tool can be used to perform all the tasks that are related to IBM Hyper-Scale Mobility.

2.2.1 XIV Management GUI features

In support of the IBM Hyper-Scale Mobility feature, the XIV Management GUI was updated with a new Online Migration view, which is available from the Remote menu in the left pane, as shown in Figure 2-1.

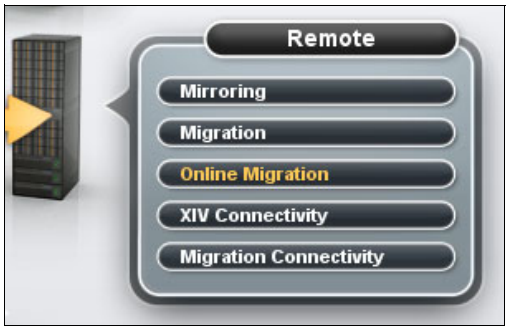

Figure 2-1 Online Migrations menu option to support IBM Hyper-Scale Mobility

The Online Migration view can also be accessed in the View section of the Main Menu, as show in Figure 2-2.

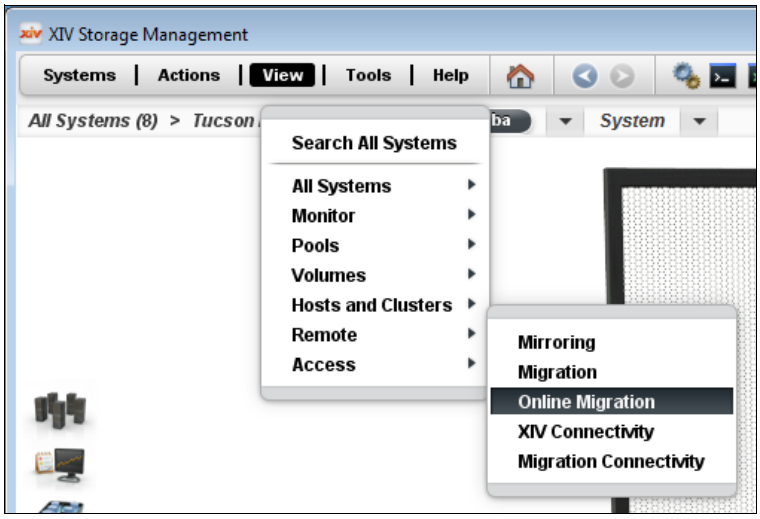

Figure 2-2 Online Migration in the View menu

Other views and GUI panels were updated to reflect support for IBM Hyper-Scale Mobility. The Multiple Storage Management System was updated to accommodate IBM Hyper-Scale Mobility.

2.2.2 XCLI functions that support IBM Hyper-Scale Mobility

The XIV Command-Line Interface (XCLI) includes a series of new commands to support IBM Hyper-Scale Mobility:

`olvm_list`	Displays details for IBM Hyper-Scale Mobility relationships on a local system.
`olvm_create`	Creates an IBM Hyper-Scale Mobility process for a volume.
`olvm_activate`	Activates (starts) a previously created IBM Hyper-Scale Mobility process.
`olvm_proxy`	The volume in the “proxy ready” state enters a proxy state.
`olvm_deactivate`	Deactivates the IBM Hyper-Scale Mobility process for a specified volume.
`olvm_abort`	Aborts an IBM Hyper-Scale Mobility relationship.
`olvm_delete`	Deletes an IBM Hyper-Scale Mobility relationship.
`olvm_delete_all_ref_to_src`	Delete all IBM Hyper-Scale Mobility relationships to a specified source target.

2.3 Using IBM Hyper-Scale Mobility

In the following examples, we perform an online volume migration by using the XIV GUI and the XCLI. In each example, the volume that is being migrated is mapped over iSCSI to a Red Hat Linux host, and the host is actively generating I/Os to the volume throughout the migration.

Here are the details of the migration example:

- The source XIV Storage System is named XIV 110077 Alba.
- The destination XIV Storage System is named XIV 1310062 Dantooine.
- The GUI volume to be migrated is name nox_001.
- The XCLI volume to be migrated is named nox_002.
- The Linux host with LUN mapping is named nox.
- The number of physical paths from the host to each XIV Storage System is two.

2.3.1 Using the XIV GUI to use IBM Hyper-Scale Mobility

This section illustrates using IBM Hyper-Scale Mobility by using the XIV GUI. We have decomposed the process in to a series of six tasks.

Task 1: Planning and preparation

First, confirm that both the source and destination XIV systems are configured and accessible in the GUI, and that there is connectivity between these systems. Figure 2-3 shows the source and destination systems with confirmed connectivity between the two systems.

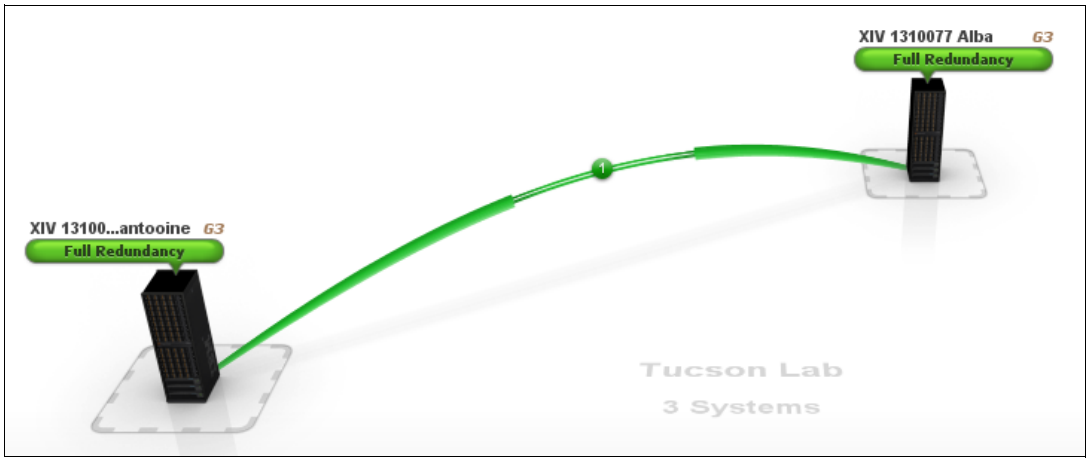

Figure 2-3 GUI Connectivity view of IBM Hyper-Scale source and destination systems

Now, you can validate the host multipath connectivity to the source volume by running the **xiv_devlist** command of the XIV Host Attachment Kit (HAK), as shown in Example 2-1.

Example 2-1 Check multipath connectivity

```
[root@nox home]# xiv_devlist
XIV Devices
------------------------------------------------------------------------------
Device               Size (GB)  Paths  Vol Name  Vol ID  XIV ID   XIV Host
------------------------------------------------------------------------------
/dev/mapper/mpathfk  17.2       2/2    nox_008   420     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfl  17.2       2/2    nox_003   415     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfm  17.2       2/2    nox_006   418     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfn  17.2       2/2    nox_002   426     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfo  17.2       2/2    nox_004   416     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfp  17.2       2/2    nox_001   425     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfq  17.2       2/2    nox_009   421     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfr  17.2       2/2    nox_007   419     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfs  17.2       2/2    nox_010   422     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathft  17.2       2/2    nox_005   417     1310077  nox
------------------------------------------------------------------------------
```

Note the two paths for the source volume, nox_001, as highlighted by the bold row. Also, note the Vol ID of 425 and XIV ID of 1310077, indicating that the volume is presented to the host from the Alba XIV Storage System.

Lastly, you can validate that the host is actively sending I/Os to the source volume from the Statistics view of that volume, as shown in Figure 2-4.

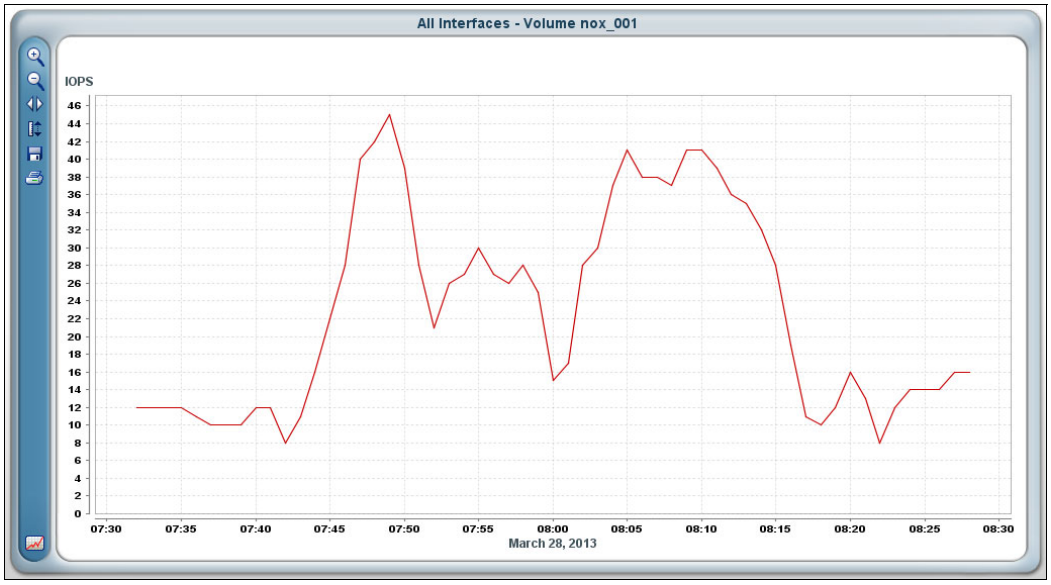

Figure 2-4 Initial Statistics view of source volume

As part of the preparation, you can also define the host to the target XIV Storage System. This action can also be completed while the migration is taking place.

To create the host definition and port definition for your host on the destination XIV Storage System, complete the following steps:

1. Click the **Hosts and Clusters** link in the **Hosts and Clusters** menu on the destination XIV Storage System, as shown in Figure 2-5.

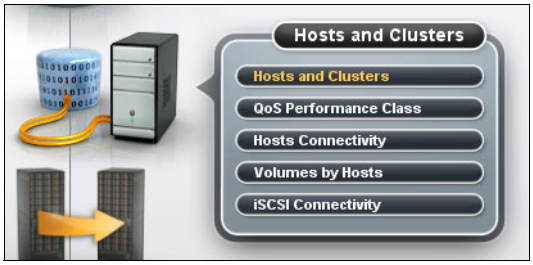

Figure 2-5 Destination XIV Storage System Hosts and Clusters menu

Our illustration applies to an iSCSI connected host. For an FC connected host, refer to the procedure that is explained in *IBM XIV Storage System: Host Attachment and Interoperability*, SG24-7904.

Restriction: Note that although our illustration uses iSCSI connectivity, the current implementation of IBM Hyper-Scale Mobility as delivered with Version 11.3 of the IBM XIV Storage System Software, only supports **Fibre Channel** connectivity.

2. Next, right-click in the window and select the **Add Host** option, as shown in Figure 2-6.

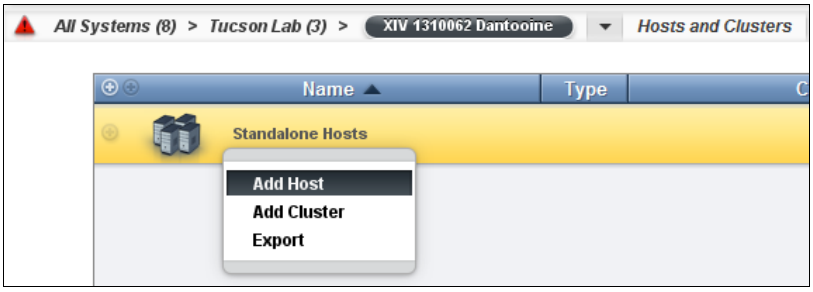

Figure 2-6 Add Host on the destination XIV Storage System

3. In the Add Host window, enter the details for the host and click **Add**, as shown in Figure 2-7. Ensure that the details match the corresponding host details from the source XIV Storage System.

   In our example, the Name of the host is nox, the Type is default, and the CHAP values are empty.

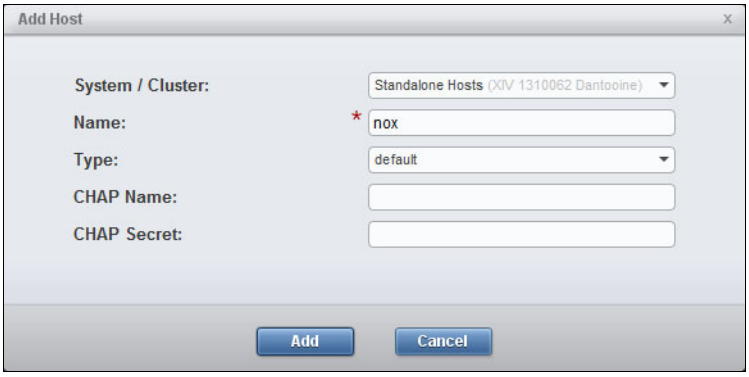

Figure 2-7 Add host details on the destination XIV Storage System

4. After the host is added to the destination XIV Storage System, add the ports for the host. Right-click the host entry and select the **Add Port** option, as shown in Figure 2-8.

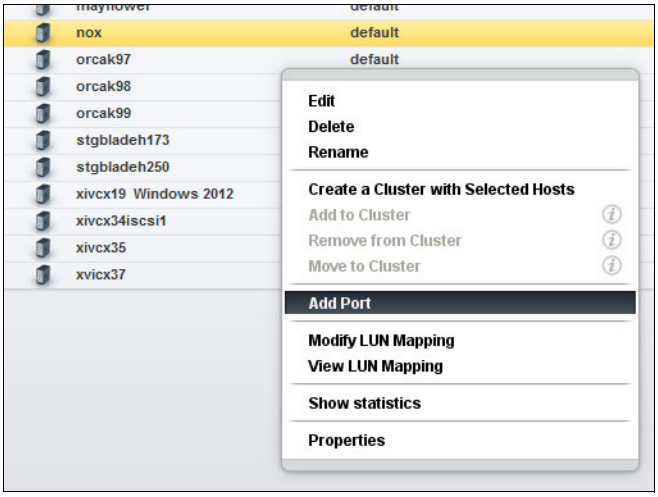

Figure 2-8 Add host port on the destination XIV Storage System

5. In the Add Port window, enter the appropriate port details, as shown in Figure 2-9, and click **Add** to add the port to the host.

   Ensure that the details match the corresponding port details from the source XIV Storage System. In our example, we choose iSCSI for the Port Type, and the iSCSI Name is iqn.1994-05.com.redhat:24fe18b0a223.

Figure 2-9 Enter port details on the destination XIV Storage System

6. The new host and port definitions should now be visible in the Hosts and Clusters view on the destination XIV Storage System, as shown in Figure 2-10.

Figure 2-10 Newly defined host and port on the destination XIV Storage System

Task 2: Setup

To complete the Setup task, complete the following steps:

1. To create the IBM Hyper-Scale Mobility relationship, click the **Online Migration** link in the **Remote** menu, as shown in Figure 2-11.

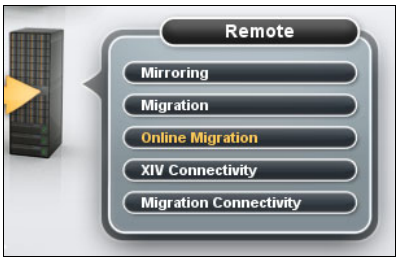

Figure 2-11 Online Migration link in the Remote menu

From the Online Migration view, click the **Create Online Migration** link in the toolbar, as shown in Figure 2-12

Figure 2-12 Create Online Migration link in the toolbar

Alternatively, from the Volumes and Snapshots view, right-click the source volume and select the **Create Online Migration** menu option, as shown in Figure 2-13. Note that the Size of the source volume is 17 GB and its Used capacity is 3 GB.

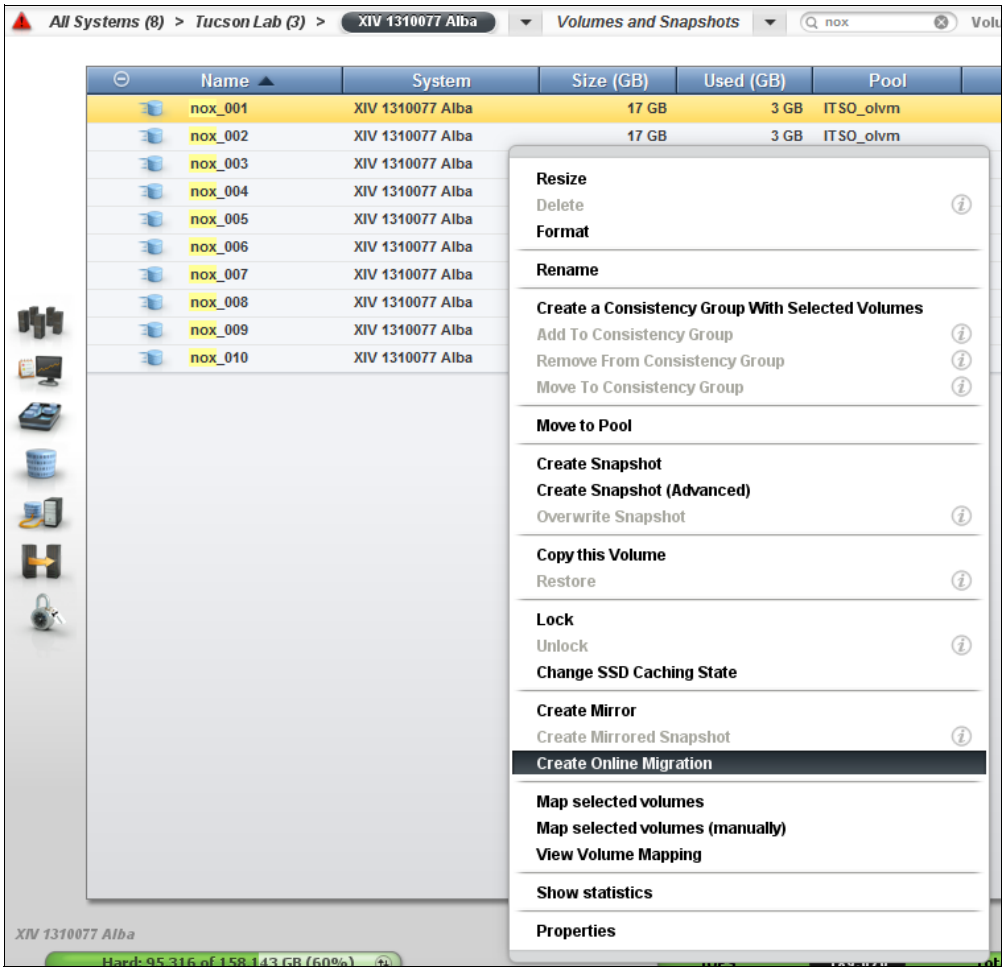

Figure 2-13 Create Online Migration menu option in Volumes and Snapshots view

Either method opens the Create Online Volume Migration window, as shown in Figure 2-14.

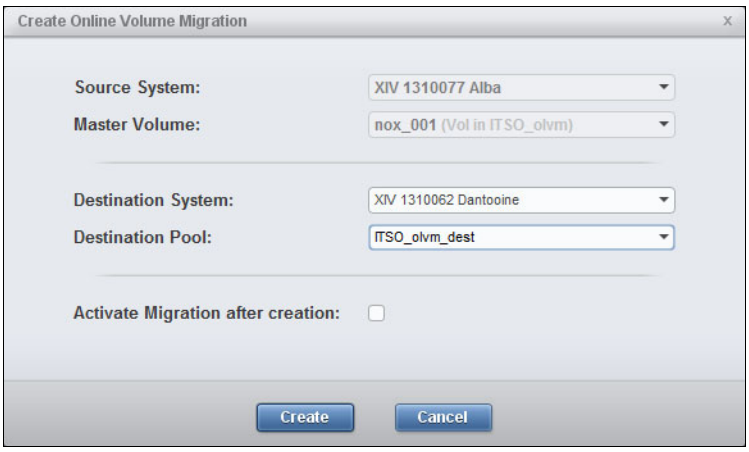

Figure 2-14 Create Online Volume Migration window

2. Use the drop-down menus that are shown in Figure 2-14 on page 16 to select the values for **Source System**, **Master Volume**, **Destination System**, and **Destination Pool**.

   In our example, the Source System is XIV 110077 Alba and the Master Volume is nox_001. The Destination System is XIV 1310062 Dantooine, and the Destination Pool is ITSO_olvm_dest.

   To immediately activate the IBM Hyper-Scale Mobility relationship upon creation, check the box. In our example, we left the box clear, as we will explicitly activate the relationship in the next step.

   Click **Create** to create the relationship.

   Tip: If you opened the Create Online Volume Migration panel by right-clicking a volume, the values for Source System and Master Volume are pre-populated and you cannot edit them.

   Consideration: A volume that is part of a mirror relationship cannot be used as the source volume for IBM Hyper-Scale Mobility without first removing that mirror.

3. The Online Migration view for the source XIV Storage System now displays the new IBM Hyper-Scale Mobility relationship, as shown in Figure 2-15. Notice that the Phase and Status are both Inactive.

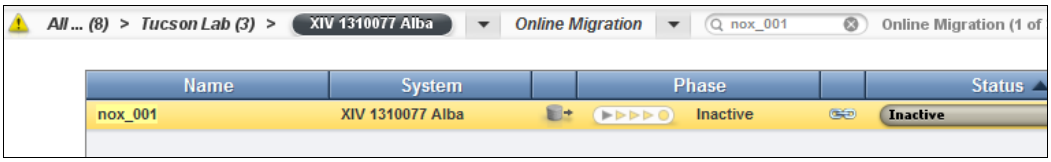

Figure 2-15 Newly created, inactive IBM Hyper-Scale Mobility relationship on the source XIV Storage System

The Online Migration view for the destination XIV Storage System also displays the new IBM Hyper-Scale Mobility relationship, as shown in Figure 2-16. Notice that the Phase and Status are also both Inactive.

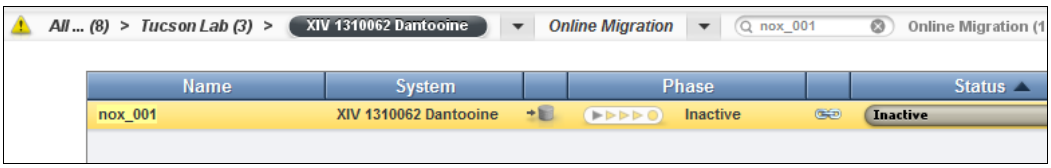

Figure 2-16 Newly created, inactive IBM Hyper-Scale Mobility relationship on the source XIV Storage System

4. Additionally, you can verify that the destination volume was created by right-clicking the IBM Hyper-Scale Mobility relationship and selecting the **Show Destination Volume** menu option, as shown in Figure 2-17.

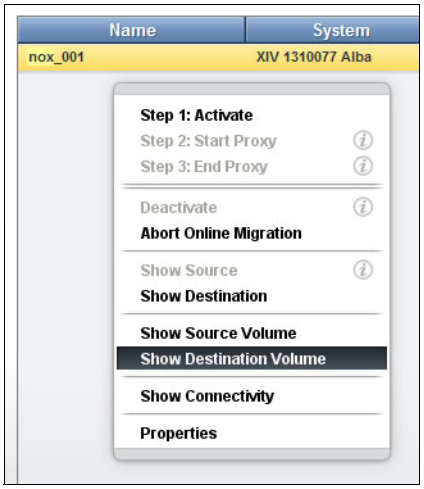

Figure 2-17 Menu for IBM Hyper-Scale Mobility relationships

Tip: The menu for IBM Hyper-Scale Mobility relationships offers useful shortcuts that are relevant to IBM Hyper-Scale Mobility tasks. With this menu, you can quickly and easily navigate between source and destination IBM Hyper-Scale Mobility systems and volumes.

5. In Figure 2-18, you can see that the destination volume was created on the destination XIV Storage System. The size of the destination volume matches the size of the source volumes, but the Used capacity of the volume is 0 GB. This is expected, as you have not yet activated the IBM Hyper-Scale Mobility relationship and the synchronization of the destination volume has not yet begun.

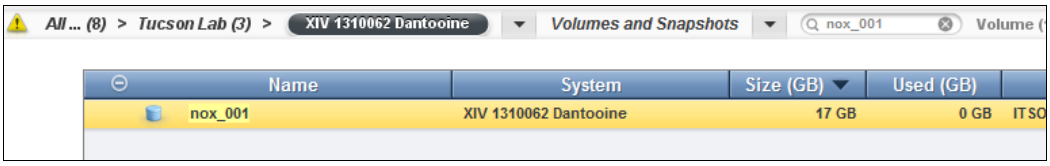

Figure 2-18 Destination volume created on the destination XIV Storage System

Note: Although the destination volume has been created, you cannot yet map the volume to the host. The destination volume in an IBM Hyper-Scale Mobility relationship cannot be mapped to a host until the Proxy phase. In addition, its Locked Status is Read Only. Here the available actions that you can perform on the volume:

- Move to Pool
- Create Snapshot
- Create Snapshot (Advanced)
- Copy this Volume
- Change SSD Caching State
- View Volume Mapping
- Show Statistic
- Properties

Task 3: Migration

To complete the Migration task, complete the following steps:

1. In the source XIV Storage System (Alba), right-click the row for the IBM Hyper-Scale Mobility relationship that you created and select the **Step 1: Activate** option, as shown in Figure 2-19.

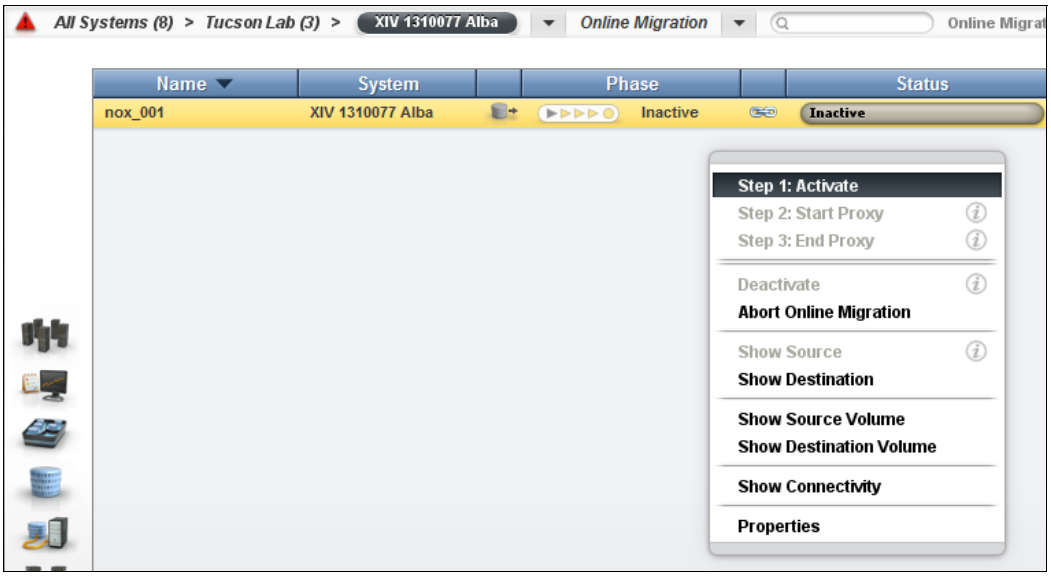

Figure 2-19 Activate the IBM Hyper-Scale Mobility relationship

This action activates the relationship and queues the process to synchronize the destination volume on the destination XIV Storage System.

Note: Only one IBM Hyper-Scale Mobility process at a time is synchronized from the source XIV Storage System.

In our example, there are no other IBM Hyper-Scale Mobility relationships on the system, so the synchronization begins immediately. The progress of the synchronization can be monitored by watching the status bar, as shown in Figure 2-20.

The phase is Migration and the status is Initializing.

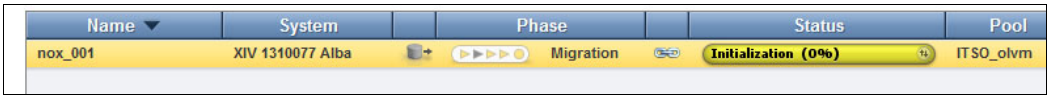

Figure 2-20 IBM Hyper-Scale Mobility status at the source XIV Storage System

2. After the synchronization is complete, the Phase changes to Proxy Ready and the Status changes to Synchronized when you view them on the source XIV Storage System, as shown in Figure 2-21.

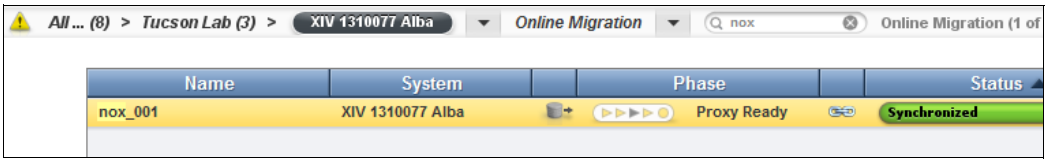

Figure 2-21 IBM Hyper-Scale Mobility Proxy Ready and Synchronized at the source XIV Storage System

Right-click the IBM Hyper-Scale Mobility relationship from the destination XIV Storage System and select **Show Destination**. You can see that the Phase, when you view it from the destination XIV Storage System, is Proxy Ready and the status is Consistent, as shown in Figure 2-22.

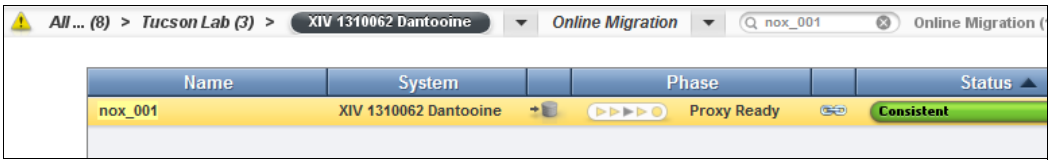

Figure 2-22 IBM Hyper-Scale Mobility Proxy Ready and Consistent at the destination XIV Storage System

Now, the destination XIV Storage System contains a consistent copy of the source volume, and the necessary host and port definitions, and you are ready to enter the actual migration stage.

Task 4: Proxying

Proxying means that the source XIV Storage System starts redirecting host I/O to the volume on the destination XIV Storage System. To start the proxy mode, complete the following steps:

1. Right-click the row for the volume migration relationship in the Online Migration view on the source XIV Storage System and select **Step 2: Start Proxy**, as shown in Figure 2-23.

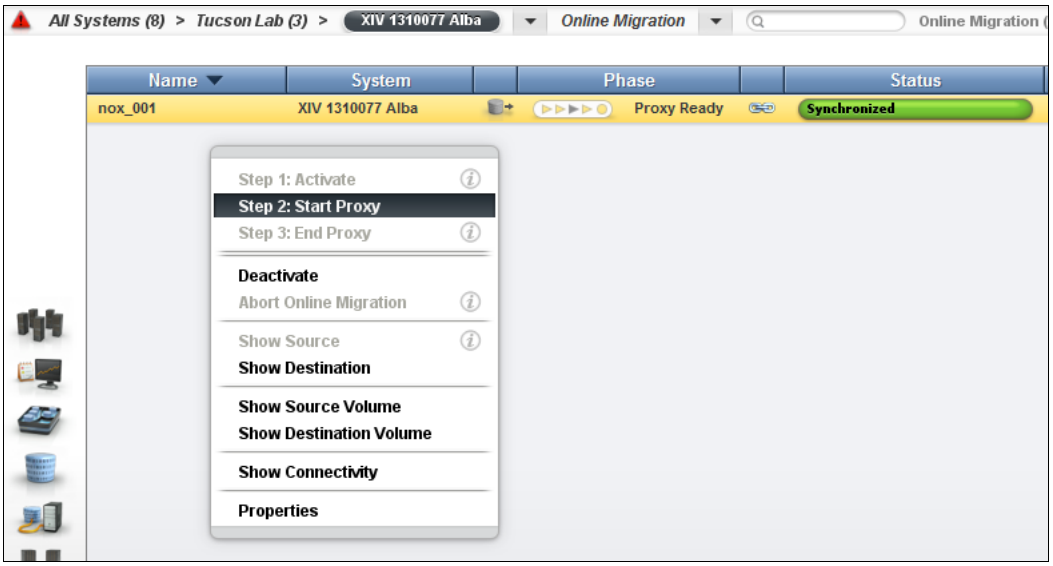

Figure 2-23 Start IBM Hyper-Scale Mobility Proxy

2. As shown in Figure 2-24, a warning message is displayed, indicating that any source volume snapshots that exist will be deleted if the proxy is started.

   Click **OK** to proceed and initiate the Proxy phase.

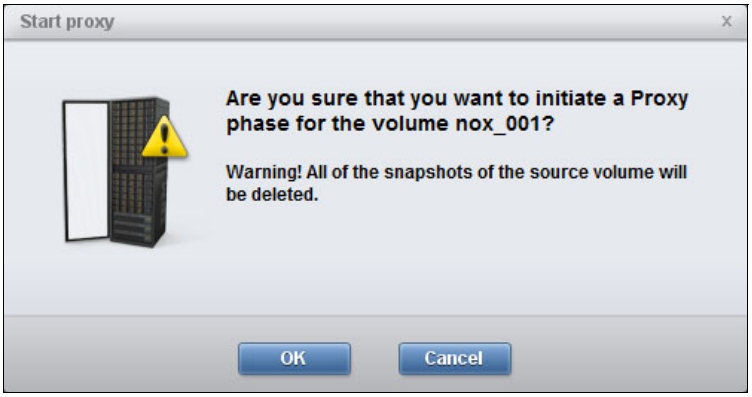

Figure 2-24 Snapshot deletion warning on proxy start

Important: Upon initiating the Proxy phase for a volume, it is no longer possible to abort the migration of this volume. Up to this point, the source volume still exists on the source XIV Storage System, and any host I/O is still synchronized between both the source and destination volumes. Clicking **OK** in this window triggers the source XIV Storage System to proxy all subsequent host I/O to the volume on the destination XIV Storage System only, and the source volume becomes inconsistent and unavailable. In fact, the source volume is now just a logical placeholder for the original volume. Its size is 0 GB; its hard (total usable) capacity is returned to the storage pool.

3. You can verify that the Proxy phase was initiated from the Online Migration view on the source XIV Storage System, as shown in Figure 2-25.

   Note that the Phase is now Proxy and the Status is now Proxy-Source.

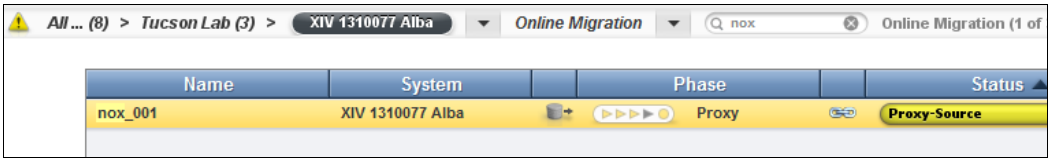

Figure 2-25 Proxy phase viewed from the source XIV Storage System

4. You can further validate the Proxy phase from the Online Migration view on the destination XIV Storage System, as shown in Figure 2-26.

   Note that the Phase is now Proxy and the Status is now Proxy-Destination.

Figure 2-26 Proxy phase viewed from the destination XIV Storage System

5. Now that the Proxy phase is successfully initiated, you are ready to map the newly created volume to the host on the destination XIV Storage System. Navigate to the destination volume by right-clicking the IBM Hyper-Scale Mobility relationship and select the **Show Destination Volume** option, as shown in Figure 2-27.

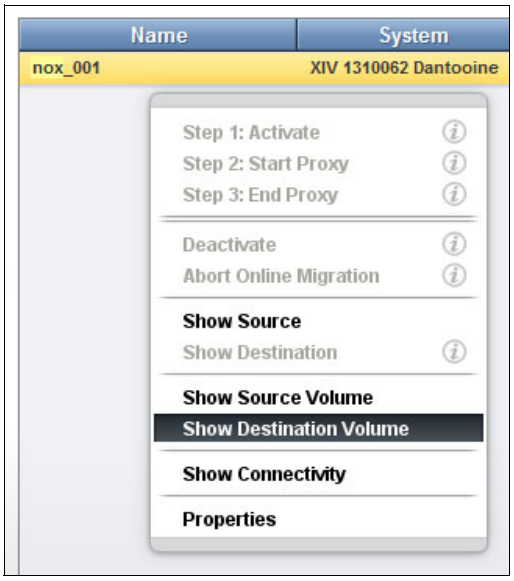

Figure 2-27 Show the destination volume from the destination IBM Hyper-Scale Mobility relationship

6. Next, right-click the volume and select **Map Selected Volumes**, as shown in Figure 2-28.

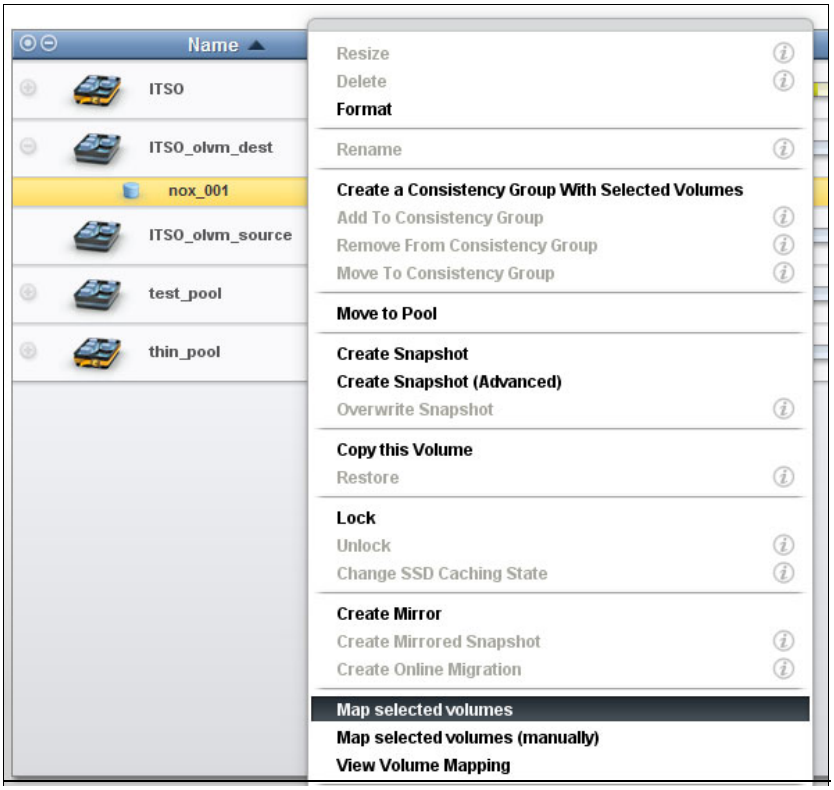

Figure 2-28 Map the migrated LUN to the host on the destination XIV Storage System

7. In the window that opens, select the new host in the drop-down menu and click **OK** to map the volume, as shown in Figure 2-29.

Figure 2-29 Select the host to map

8. After the destination volume is mapped to the host, you need to rescan the devices from the host to pick up the new paths to the volume on the destination system. Run **`xiv_iscsi_admin -R`** and then run **`xiv_devlist`** from the host, as shown in Example 2-2.

Example 2-2 Host rescan

```
[root@nox home]#  xiv_iscsi_admin -R
[root@nox home]# xiv_devlist
XIV Devices
------------------------------------------------------------------------------
Device               Size (GB)  Paths  Vol Name  Vol ID  XIV ID   XIV Host
------------------------------------------------------------------------------
/dev/mapper/mpathfk  17.2       2/2    nox_008   420     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfl  17.2       2/2    nox_003   415     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfm  17.2       2/2    nox_006   418     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfn  17.2       2/2    nox_002   426     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfo  17.2       2/2    nox_004   416     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfp  17.2       4/4    nox_001   1607    1310062  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfq  17.2       2/2    nox_009   421     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfr  17.2       2/2    nox_007   419     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfs  17.2       2/2    nox_010   422     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathft  17.2       2/2    nox_005   417     1310077  nox
------------------------------------------------------------------------------
```

Note the four paths (two additional) for our destination volume, nox_001, in the bold row. Also, note that the Vol ID changed to 1607 and the XIV ID changed to 1310062, which indicates that the volume is presented from the destination XIV Storage System and confirming that the source XIV Storage System (Alba) is proxying all host I/O to the destination volume nox_001 on the destination XIV Storage System (Dantooine).

Task 5: Cleanup

Now that you have validated that the host has connectivity to the volume through the new paths to the destination XIV Storage System, you are ready to unmap the volume from the host on the source XIV Storage System and remove the paths to the source volume from the host.

To accomplish this task, complete the following steps:

1. In the GUI, navigate to the Volumes by Hosts view of the source XIV Storage System.

   Right-click the source volume and select the **Unmap** option, as shown in Figure 2-30.

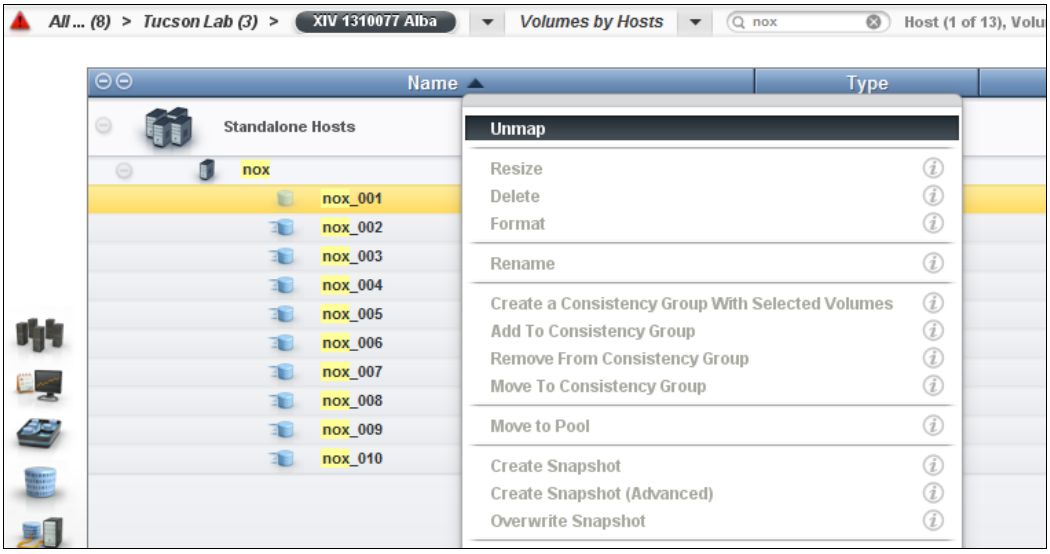

Figure 2-30 Unmap the source volume from the host

2. A confirmation window opens and prompts you to confirm that you want to unmap the selected volume, as shown in Figure 2-31. Click **OK** to unmap the source volume from the host.

Figure 2-31 Confirm the unmapping of the source volume from the host

3. Now that you have unmapped the volume from the host, you can remove the paths to the source volume from the host. Run **xiv_iscsi_admin -R** command and then run **xiv_devlist** from the host, as shown in Example 2-3.

Example 2-3 Removing the paths

```
[root@nox home]#  xiv_iscsi_admin -R
[root@nox home]# xiv_devlist
XIV Devices
------------------------------------------------------------------------------
Device               Size (GB)  Paths  Vol Name  Vol ID  XIV ID   XIV Host
------------------------------------------------------------------------------
/dev/mapper/mpathfk  17.2       2/2    nox_008   420     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfl  17.2       2/2    nox_003   415     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfm  17.2       2/2    nox_006   418     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfn  17.2       2/2    nox_002   426     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfo  17.2       2/2    nox_004   416     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfp  17.2       2/2    nox_001   1607    1310062  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfq  17.2       2/2    nox_009   421     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfr  17.2       2/2    nox_007   419     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfs  17.2       2/2    nox_010   422     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathft  17.2       2/2    nox_005   417     1310077  nox
------------------------------------------------------------------------------
```

Note the tow paths for our destination volume, nox_001, in the bold row. Also, note the Vol ID is still 1607 and the XIV ID is still 1310062, which indicates that the host is connected *only* to the destination volume on the destination XIV Storage System (Dantooine).

Task 6: Post-cleanup

You have successfully used IBM Hyper-Scale Mobility to migrate the volume nox_001 from XIV Storage System Alba to XIV Storage System Dantooine without incurring any downtime on the host.

The final step is to end the proxy. To accomplish this task, complete the following steps:

1. In the XIV GUI, navigate to the Online Migration view of the source XIV Storage System. Right-click the volume relationship and select the **Step 3: End Proxy** option, as shown in Figure 2-32.

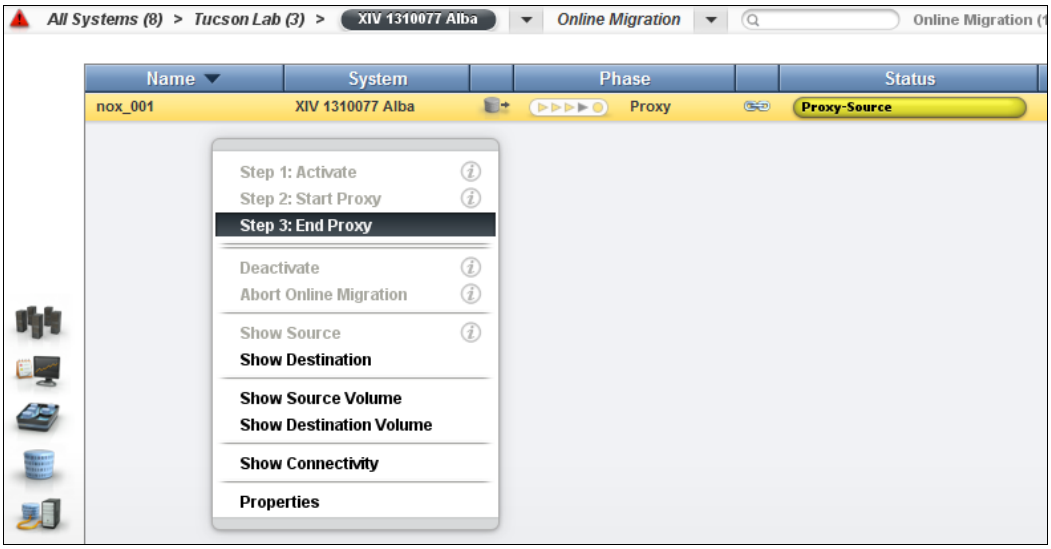

Figure 2-32 End the IBM Hyper-Scale Mobility proxy

2. A confirmation window opens, as shown in Figure 2-33, to ensure that you mapped the host to the destination volume and confirmed access to it. This was confirmed in the Cleanup stage.

   Click **OK** to end the proxy.

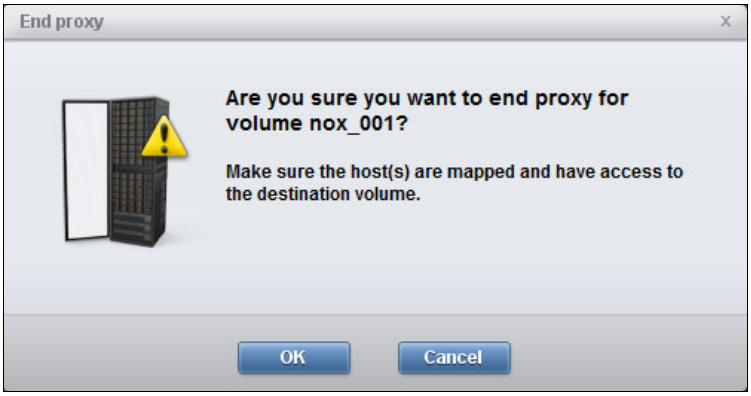

Figure 2-33 Confirm the ending the IBM Hyper-Scale Mobility proxy

3. The proxy has been removed, and you can confirm the expected end state of the volumes on both the source and destination XIV systems.

On the source XIV Storage System, Alba, you can see from the Volumes and Snapshots view that the volume nox_001 no longer exists, as shown in Figure 2-34.

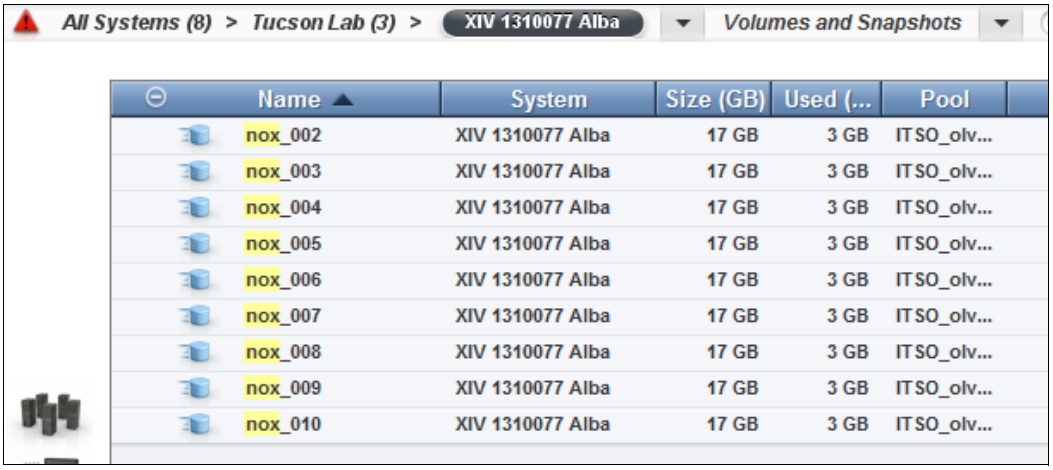

Figure 2-34 Confirm that the source volume is no longer on the source XIV Storage System

4. On the destination XIV Storage System, Dantooine, you can see from the Volumes and Snapshots view that the volume nox_001 exists, as shown in Figure 2-35. Note that the Size of 17 GB and Used capacity of 3 GB each match the corresponding values from the source volume that was noted in “Task 2: Setup” on page 15.

Figure 2-35 Confirm that the destination volume exists on the destination XIV Storage System

5. If you right-click the volume and select **Show Statistics**, you can see that the host I/Os are still active on the destination volume, as shown in Figure 2-36.

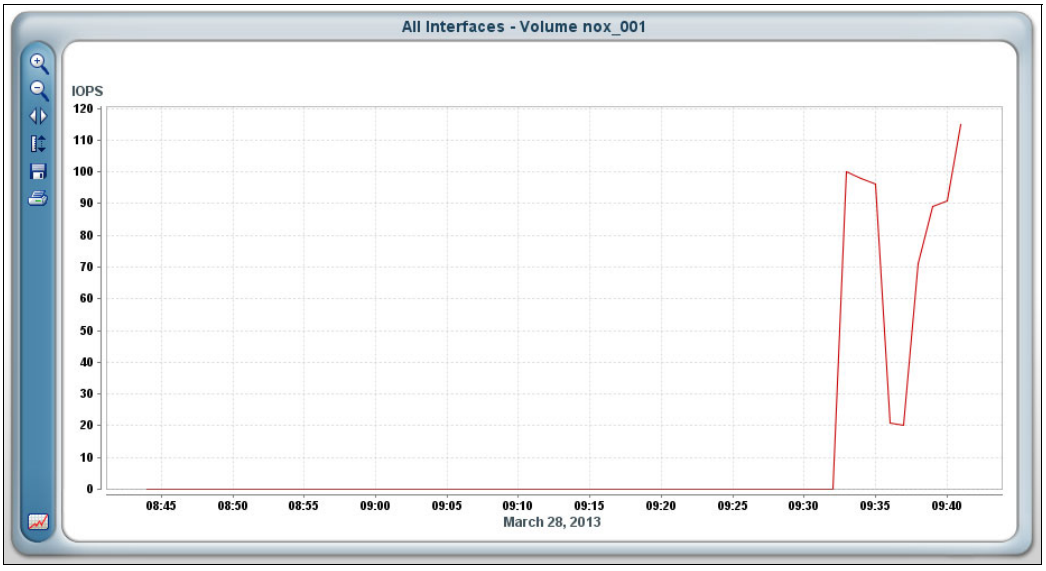

Figure 2-36 Statistics view of the destination volume after IBM Hyper-Scale Mobility is complete

2.3.2 Using the XIV Command-Line Interface to use IBM Hyper-Scale Mobility

This section illustrates using the XIV Command-Line Interface (XCLI) to use IBM Hyper-Scale Mobility. The process consists of the same six tasks that are illustrated in 2.3.1, “Using the XIV GUI to use IBM Hyper-Scale Mobility” on page 11.

Task 1: Planning and preparation

To perform an online migration of an XIV volume by using the XCLI, first confirm that both the source and destination XIV systems are configured and accessible through the XCLI, and that there is connectivity between these systems. Example 2-4 shows the **target_connectivity_list** command that is run on the source XIV Storage System to confirm the connectivity. The output that is shown in Example 2-4 shows that the destination XIV Storage System is connected through two active Fibre Channel connections.

Example 2-4 target_connectivity_list

```
XIV 1310077 Alba>>target_connectivity_list
Target Name             Remote Port        FC Port         IP Interface   Active   Up
XIV 1310062 Dantooine   50017380274E0181   1:FC_Port:8:4                  yes      yes
XIV 1310062 Dantooine   50017380274E0191   1:FC_Port:9:4                  yes      yes
```

In addition, confirm that any host that has mappings to the source volume on the source XIV Storage System has the appropriate access to the destination XIV Storage System. Consider the following items:

- If you are migrating an iSCSI LUN, ensure that the host can access the destination system over the IP network.
- If you are migrating an FC LUN, ensure that the host is correctly zoned to the destination system.

Now, you can validate the host multipath connectivity to the source volume by running the **xiv_devlist** command of the XIV Host Attachment Kit (HAK), as shown in Example 2-5

Example 2-5 xiv_devlist

```
[root@nox home]# xiv_devlist
XIV Devices
------------------------------------------------------------------------------
Device               Size (GB)  Paths  Vol Name  Vol ID  XIV ID   XIV Host
------------------------------------------------------------------------------
/dev/mapper/mpathfk  17.2       2/2    nox_008   420     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfl  17.2       2/2    nox_003   415     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfm  17.2       2/2    nox_006   418     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfn  17.2       2/2    nox_002   426     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfo  17.2       2/2    nox_004   416     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfp  17.2       2/2    nox_001   1607    1310062  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfq  17.2       2/2    nox_009   421     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfr  17.2       2/2    nox_007   419     1310077  nox
------------------------------------------------------------------------------
```

```
/dev/mapper/mpathfs  17.2       2/2    nox_010   422     1310077  nox
-------------------------------------------------------------------------
/dev/mapper/mpathft  17.2       2/2    nox_005   417     1310077  nox
-------------------------------------------------------------------------
```

Note the two paths for the source volume, nox_002, in the bold row. Also, note the Vol ID of 426 and XIV ID of 1310077, which indicates that the volume is presented to the host from the source XIV Storage System Alba.

Example 2-6 shows the output of a **vol_list** command for the source and destination XIV systems before you start IBM Hyper-Scale Mobility.

Example 2-6 vol_list by pool

```
#Source:
XIV 1310077 Alba>>vol_list pool=ITSO_olvm
Name      Size (GB)   Master Name   Consistency Group   Pool        Creator           Proxy            Used
Capacity (GB)
nox_003   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_004   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_005   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_006   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_007   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_008   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_009   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_010   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   3
nox_001    17                                 ITSO_olvm                     OLVM_TYPE_NONE   3
nox_002    17                                 ITSO_olvm                     OLVM_TYPE_NONE   3

#Destination:
XIV 1310062 Dantooine>>vol_list pool=ITSO_olvm_dest
No volumes match the given criteria
```

Task 2: Setup

To perform the Setup task, you must create the IBM Hyper-Scale Mobility relationship; to do so, run **olvm_create**, as shown in Example 2-7. The required parameters are **vol=**, **remote_pool=**, and **target=**.

Attention: Any existing snapshot for the IBM Hyper-Scale Mobility source volume will be *deleted without explicit warning* from XCLI.

Example 2-7 olvm_create

```
#Source:
XIV 1310077 Alba>>olvm_create vol=nox_002 remote_pool=ITSO_olvm_dest target="XIV 1310062 Dantooine"

Warning:   ARE_YOU_SURE_YOU_WANT_TO_APPLY_OLVM y/n: y
Command executed successfully.

XIV 1310077 Alba>>olvm_list vol=nox_002
Volume name         Role   Remote System           Active   Phase                    State          Link Up
nox_002             source XIV 1310062 Dantooine   no       OLVM_PHASE_MIGRATION     Initializing   yes
XIV 1310077 Alba>>

#Destination:

XIV 1310062 Dantooine>>olvm_list vol=nox_002
```

```
Volume name         Role          Remote System      Active   Phase                    State        Link Up
nox_002             destination   XIV 1310077 Alba   no       OLVM_PHASE_MIGRATION     Initializing yes
```

As seen in Example 2-7 on page 30, running **olvm_create** accomplishes the following tasks:

- Creates a volume on the destination XIV Storage System, with same name as the source volume, in the specified **remote_pool**.
- Creates an OLVM relationship between the source XIV Storage System and the destination XIV Storage System

The **olvm_list** command only creates the relationship. The IBM Hyper-Scale Mobility relationship is not activated in this step, and the destination volume is empty.

Task 3: Migration

After the IBM Hyper-Scale Mobility relationship is created, activate it by running **olvm_activate**, as shown in Example 2-8.

Example 2-8 olvm_activate

```
#Source:

XIV 1310077 Alba>>olvm_activate vol=nox_002

Warning:   ARE_YOU_SURE_YOU_WANT_TO_ACTIVATE_OLVM y/n:
Command executed successfully.
XIV 1310077 Alba>>

XIV 1310077 Alba>>olvm_list vol=nox_002
Volume name   Role   Remote System          Active   Phase                  State          Link Up
nox_002       source XIV 1310062 Dantooine  yes      OLVM_PHASE_MIGRATION   Initializing   yes
XIV 1310077 Alba>>

#After initialization is complete:

XIV 1310077 Alba>>olvm_list vol=nox_002
Volume name   Role   Remote System          Active   Phase                    State          Link Up
nox_002       source XIV 1310062 Dantooine  yes      OLVM_PHASE_PROXY_READY   Synchronized   yes
XIV 1310077 Alba>>

#Destination:

XIV 1310062 Dantooine>>olvm_list vol=nox_002
Volume name   Role          Remote System      Active   Phase                  State          Link Up
nox_002       destination   XIV 1310077 Alba   yes      OLVM_PHASE_MIGRATION   Initializing   yes
XIV 1310062 Dantooine>>

#After initialization is complete:

XIV 1310062 Dantooine>>olvm_list vol=nox_002
Volume name   Role          Remote System      Active   Phase                    State        Link Up
nox_002       destination   XIV 1310077 Alba   yes      OLVM_PHASE_PROXY_READY   Consistent   yes
XIV 1310062 Dantooine>>
```

The **olvm_activate** command initializes the synchronization of the source and destination volumes. Note that the State becomes active (`Active=yes`). The synchronization is queued, as only one IBM Hyper-Scale Mobility process is synchronized at a time.

The time that is required to complete the synchronization depends on numerous factors, including how many migrations are active and the amount of data that needs to be synchronized per volume.

Task 4: Proxying

Proxying means that the source XIV Storage System starts redirecting host I/O to the volume on the destination XIV Storage System. To start the proxy mode, complete the following steps:

1. After the synchronization is complete, the Phase changes to Proxy_Ready and the Status changes to Synchronized, as shown in Example 2-8 on page 31

   While the migration takes place, you can create the host and host port definitions by running the commands shown in Example 2-9. Note that these definitions can be done before and independently of the migration process.

Example 2-9 host_define, host_add_port, map_vol

```
#Destination:

XIV 1310062 Dantooine>>host_define host=nox
Command executed successfully
XIV 1310062 Dantooine>>

XIV 1310062 Dantooine>>host_add_port host=nox iscsi_name=iqn.1994-05.com.redhat:24fe18b0a223
Command executed successfully
XIV 1310062 Dantooine>>
```

2. Run the XCLI command **olvm_proxy** to start the Proxy phase, as shown in Example 2-10.

Important: Upon initiating the Proxy phase for a volume, it is no longer possible to abort the IBM Hyper-Scale Mobility for this volume. Up to this point, the source volume still exists on the source XIV Storage System, and any host I/O is still synchronized between both source and destination volumes. Answering y to confirm the command execution shown in Example 2-10 triggers the source XIV Storage System to proxy all subsequent host I/O to the volume on the destination XIV Storage System only, and the source volume becomes inconsistent and unavailable. In fact, the source volume is now just a logical placeholder for the original volume. It size is 0 GB; its hard (total usable) capacity is returned to the storage pool.

Example 2-10 olvm_proxy

```
#Source:

XIV 1310077 Alba>>olvm_proxy vol=nox_002

Warning:   ARE_YOU_SURE_YOU_WANT_TO_OLVM_PROXY y/n:
Command executed successfully.
XIV 1310077 Alba>>olvm_list vol=nox_002
Volume name   Role   Remote System           Active   Phase              State   Link Up
nox_002       source XIV 1310062 Dantooine   yes      OLVM_PHASE_PROXY   Proxy   yes  olvm
XIV 1310077 Alba>>

#Destination:

XIV 1310062 Dantooine>>olvm_list vol=nox_002
```

The start of the Proxy phase can be verified by running the **olvm_list** command, as shown in Example 2-13 on page 34. The State of the source volume changes to Proxy, and the State of the destination volume changes to Proxied. All host I/O to the source volume is redirected (proxied) to the destination volume.

The Proxy phase is now successfully initiated, and you are ready to map the destination volume to the host by running **map_vol**, as shown in Example 2-11.

Example 2-11 map_vol

```
#Destination:

XIV 1310062 Dantooine>>map_vol vol=nox_002 host=nox lun=2
Command executed successfully.
XIV 1310062 Dantooine>>
```

After mapping, rescan the devices from the host to pick up the new paths to the volume on the destination XIV Storage System. Run **xiv_iscsi_admin -R** and then run **xiv_devlist** from the host, as shown in Example 2-12.

Example 2-12 xiv_iscsi_admin -R and xiv_devlist

```
[root@nox home]# xiv_iscsi_admin -R
[root@nox home]# xiv_devlist
XIV Devices
------------------------------------------------------------------------------
Device               Size (GB)  Paths  Vol Name  Vol ID  XIV ID   XIV Host
------------------------------------------------------------------------------
/dev/mapper/mpathfk  17.2       2/2    nox_008   420     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfl  17.2       2/2    nox_003   415     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfm  17.2       2/2    nox_006   418     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfn  17.2       4/4    nox_002   1738    1310062  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfo  17.2       2/2    nox_004   416     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfp  17.2       2/2    nox_001   1607    1310062  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfq  17.2       2/2    nox_009   421     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfr  17.2       2/2    nox_007   419     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathfs  17.2       2/2    nox_010   422     1310077  nox
------------------------------------------------------------------------------
/dev/mapper/mpathft  17.2       2/2    nox_005   417     1310077  nox
------------------------------------------------------------------------------
```

Note the four paths (two additional) for our destination volume, nox_002, in the bold row. Also, note that the Vol ID has changed to 1738 and the XIV ID has changed to 1310062, indicating that the volume is presented from the destination XIV Storage System and confirming that the source XIV Storage System, Alba, is proxying all host I/O to the destination volume nox_002 on the destination XIV Storage System Dantooine.

Task 5: Cleanup

Now that you have validated that the host has connectivity to the destination volume through the new paths to the destination XIV Storage System, you are ready to unmap the source volume on the source XIV Storage System from the host, as shown in Example 2-13.

Example 2-13 unmap_vol

```
#Source:

XIV 1310077 Alba>>unmap_vol vol=nox_002 host=nox
Command executed successfully.
XIV 1310077 Alba>>

XIV 1310077 Alba>>olvm_list vol=nox_002
Volume name   Role   Remote System           Active   Phase              State   Link Up
nox_002       source XIV 1310062 Dantooine   yes      OLVM_PHASE_PROXY   Proxy   yes

#Destination:

XIV 1310062 Dantooine>>olvm_list vol=nox_002
Volume name   Role          Remote System      Active   Phase              State   Link Up
nox_002       destination   XIV 1310077 Alba   yes      OLVM_PHASE_PROXY   Proxied yes
XIV 1310062 Dantooine>>
```

After you unmap the source volume from the host, remove the paths to the source volume from the host by running **xiv_iscsi_admin -R** and then running **xiv_devlist**, as shown in Example 2-14.

Example 2-14 xiv_iscsi_admin -R and xiv_devlist

```
[root@nox home]# xiv_iscsi_admin -R
[root@nox home]# xiv_devlist
XIV Devices
-------------------------------------------------------------------------------
Device               Size (GB)  Paths  Vol Name  Vol ID  XIV ID   XIV Host
-------------------------------------------------------------------------------
/dev/mapper/mpathfk  17.2       2/2    nox_008   420     1310077  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfl  17.2       2/2    nox_003   415     1310077  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfm  17.2       2/2    nox_006   418     1310077  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfn  17.2       2/2    nox_002   1738    1310062  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfo  17.2       2/2    nox_004   416     1310077  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfp  17.2       2/2    nox_001   1607    1310062  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfq  17.2       2/2    nox_009   421     1310077  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfr  17.2       2/2    nox_007   419     1310077  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathfs  17.2       2/2    nox_010   422     1310077  nox
-------------------------------------------------------------------------------
/dev/mapper/mpathft  17.2       2/2    nox_005   417     1310077  nox
-------------------------------------------------------------------------------
```

Note the two paths to the destination volume, nox_002, in the bold row. Also, note that the Vol ID is still 1738 and the XIV ID is still 1310062, indicating that the host is connected only to the destination volume on the destination XIV Storage System Dantooine.

Task 6: Post-cleanup

You have successfully used IBM Hyper-Scale Mobility to migrate the nox_002 volume from XIV Storage System Alba to XIV Storage System Dantooine without incurring any downtime on the host. The final step is to end the proxy and delete the relationship. To accomplish this task, run **olvm_delete**, as shown in Example 2-15.

Example 2-15 olvm_delete

```
#Source:
XIV 1310077 Alba>>olvm_delete vol=nox_002

Warning:   ARE_YOU_SURE_YOU_WANT_TO_DELETE_OLVM_RELATIONSHIP_IN_THIS_PHASE y/n:
Command executed successfully.

XIV 1310077 Alba>>olvm_list vol=nox_002
No olvm match the given criteria
XIV 1310077 Alba>>

#Destination:
XIV 1310062 Dantooine>>olvm_list vol=nox_002
No olvm match the given criteria
XIV 1310062
```

The proxy was removed, and you can confirm the expected end state of the volumes on both the source and destination XIV Storage Systems by running **vol_list** commands from each system. Example 2-16 shows the output of the **vol_list** commands that were run on the source and destination XIV systems after the migration is complete.

Example 2-16 vol_list by pool

```
#Source:
XIV 1310077 Alba>>vol_list pool=ITSO_olvm
Name      Size (GB)   Master Name   Consistency Group   Pool        Creator           Proxy            Used
Capacity (GB)
nox_003   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
nox_004   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
nox_005   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
nox_006   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
nox_007   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
nox_008   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
nox_009   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
nox_010   17                                  ITSO_olvm   xiv_development   OLVM_TYPE_NONE   5
XIV 1310077 Alba>>

#Destination:
XIV 1310062 Dantooine>>vol_list pool=ITSO_olvm_dest
Name      Size (GB)   Master Name   Consistency Group   Pool             Creator   Proxy            Used
Capacity (GB)
nox_002   17                                  ITSO_olvm_dest           OLVM_TYPE_NONE   5
XIV 1310062 Dantooine>>
```

Related publications

The publications that are listed in this section are considered suitable for a more detailed discussion of the topics that are covered in this paper.

IBM Redbooks

The following IBM Redbooks publications provide more information about the topic in this document. Some publications referenced in this list might be available in softcopy only.

- *IBM XIV Storage System: Copy Services and Migration*, SG24-7759
- *IBM XIV Storage System: Host Attachment and Interoperability*, SG24-7904
- *Solid-State Drive Caching in the IBM XIV Storage System*, REDP-4842
- *Using the IBM XIV Storage System in OpenStack Cloud Environments*, REDP-4971
- *XIV Storage System in a VMware Environment*, REDP-4965

You can search for, view, download, or order these documents and other Redbooks, Redpapers, Web Docs, draft and additional materials, at the following website:

ibm.com/redbooks

Other publications

These publications are also relevant as further information sources:

- *IBM Hyper-Scale and Its Implementation in XIV Storage*, found at:

  http://www.ibm.com/common/ssi/cgi-bin/ssialias?subtype=WH&infotype=SA&appname=STGE_TS_DS_USEN&htmlfid=TSL03121USEN&attachment=TSL03121USEN.PDF
- *IBM XIV Remote Support Proxy Installation and User's Guide*, GA32-0795
- *IBM XIV Storage System Application Programming Interface,* GC27-3916
- *IBM XIV Storage System Management Tools Version 4.0 User Guide* SC27-4230-00
- *IBM XIV Storage System Planning Guide, GC27-3913*
- *IBM XIV Storage System: Product Overview*, GC27-3912
- *IBM XIV Storage System User Manual*, GC27-3914
- *IBM XIV Storage System XCLI Utility User Manual*, GC27-3915

Online resources

These websites are also relevant as further information sources:

- IBM XIV Storage System Information Center:

  http://publib.boulder.ibm.com/infocenter/ibmxiv/r2/index.jsp

- IBM XIV Storage System website:
  http://www.ibm.com/systems/storage/disk/xiv/index.html
- System Storage Interoperability Center (SSIC):
  http://www.ibm.com/systems/support/storage/config/ssic/index.jsp

Help from IBM

IBM Support and downloads

ibm.com/support

IBM Global Services

ibm.com/services

IBM XIV Storage System

IBM Hyper-Scale Mobility Overview and Usage

Redpaper™

Benefit from nondisruptive data mobility between XIV systems

Understand the IBM Hyper-Scale Mobility Proxy mode

Learn to use IBM Hyper-Scale Mobility using the GUI or XCLI

IBM Hyper-Scale introduces two major new technologies, both implemented in the IBM XIV Storage System (Gen3 models):

- The first is IBM Hyper-Scale Manager, a flexible, consolidated multi-system management application that was originally released in October 2012 as “Multi-System Manager”. IBM Hyper-Scale Manager is based on and seamlessly integrated with the XIV GUI and spans multiple XIV systems.
- The second new technology, IBM Hyper-Scale Mobility, is the topic of this publication. It is a powerful function for moving volumes between storage containers transparently, with no disruption to host applications.

IBM Hyper-Scale helps you easily overcome provisioning scenarios that normally challenge traditional systems. IBM Hyper-Scale can accommodate several critical customer scenarios for data mobility, load balancing, over-provisioning, and storage system repurposing.

This IBM Redpaper publication provides a broad understanding of the IBM Hyper-Scale Mobility feature. The paper describes the IBM Hyper-Scale architecture and includes detailed step by step scenarios that illustrate the online volume migration process, both from the XIV GUI and the XIV Command-Line Interface (XCLI).

This publication is intended for XIV customers and users who want a practical understanding of IBM Hyper-Scale Mobility concepts and usage.

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