IBM
Version 7 Release 5

Easy Tier Heat Map Transfer Utility

IBM

Edition notice

Contents

Summary of changes

The IBM® Heat Map Transfer Utility guide introduces the following new enhancement. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Changed Information

The heat map transfer utility supports Metro Global Mirror replication in addition to Metro Mirror, Global Copy, and Global Mirror functions. For more information, see Chapter 1, "Easy Tier Heat Map Transfer Utility," on page 1.

Chapter 1. Easy Tier Heat Map Transfer Utility

A *heat map* is a workload activity metric that is calculated for each extent in a logical volume. The workload activity is expressed as a temperature gradient from hot (high activity) to cold (low activity). Use of the heat map transfer utility requires the Easy Tier® monitoring function to be enabled at each of the primary and secondary storage systems that are involved in the heat map transfer.

The heat map transfer utility periodically transfers Easy Tier heat map information from primary to secondary storage systems. The secondary storage system generates migration plans based on the heat map data and (the secondary storage system's) current physical configuration. In this way, the performance characteristics of the secondary storage are consistently updated to reflect that of primary storage. Multiple secondary storage systems are supported. Alternatively, you can have multiple primary storage systems that are associated with a single secondary storage system. It is recommended that the secondary storage system has the same physical configuration as the primary storage system. Secondary storage systems are then workload optimized based on primary storage system usage, with no performance penalties if data recovery is necessary.

Note: Currently, the heat map transfer utility does not support replicating tier assignment instructions of the Easy Tier Application from the primary to secondary storage systems. To reflect the same tier assignment on the secondary storage systems, issue the same tier assignment commands on the secondary storage systems.

Data that occurs in the I/O cache layer (including the storage and server-side cache) is not monitored by Easy Tier and not reflected in an Easy Tier heat map.

If a workload failover occurs, the secondary storage system:
- Uses the heat map data that is transferred from the primary storage system.
- Maintains performance levels equivalent to the primary storage system while the primary storage system is unavailable.

Note: Without the same physical configuration, a secondary storage site is able to replicate the heat map data, but is unlikely to be able to replicate the performance characteristics of the primary storage system.

The heat map transfer utility runs either on a separate Windows or Linux host, or on Tivoli® Storage Productivity Center for Replication. From the host, the heat map transfer utility accesses the primary and secondary storage sites by using an out-of-band IP connection. Transfer of heat map data occurs through the heat map transfer utility host, as illustrated in Figure 1 on page 2.
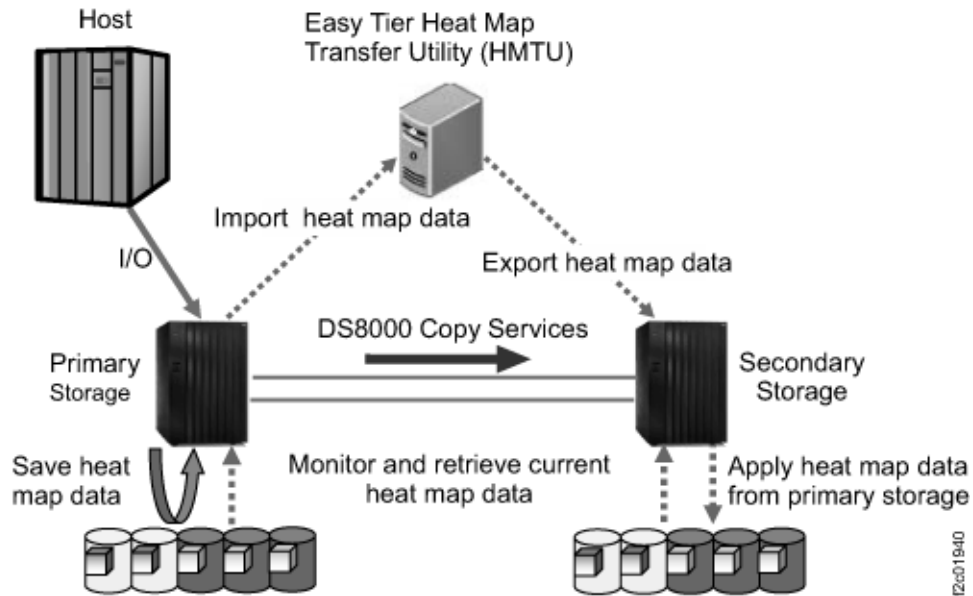
Figure 1. Flow of heat map data

The heat map transfer utility imports the heat map data from the primary storage system, and analyzes this data to:

- Identify those volumes that have a peer-to-peer remote client (PPRC) relationship.
- Determine the type of PPRC relationship that exists. The relationship can be Metro Mirror, Global Copy, Global Mirror, or Metro Global Mirror.

In a Metro Global Mirror environment, DS8000 storage systems can be added under the heat map transfer utility management. Under this management, the heat map transfer utility treats the systems as Metro Mirror plus Global Mirror (Global Copy and FlashCopy) relationships. The utility detects the Metro Mirror and Global Mirror relationships automatically and performs the heat map data transfer for the relationships on the systems separately.

There are restrictions in a heat map transfer in Metro Global Mirror environment. For example, assume volumes A, B, C and D, where:

- Volume A is the Metro Mirror primary (or source) volume
- Volume B is the Metro Mirror secondary (or target) volume and Global Mirror primary volume at the same time.
- Volume C is the Global Mirror secondary volume and FlashCopy source volume at the same time. The FlashCopy target volume is referred to as the D volume.
  - Heat map data is transferred only from volumes A and B and volumes B and C. No heat map data is transferred to the volume D copy or any additional test copies that you create.
  - Heat map data that is transferred to volume C might lag for a maximum of 36 hours from volume A. After the transfer to volumes A and B is complete, it might take a maximum of 24 hours (the default Easy Tier heat map data generation interval) for volume B to generate heat map data. There is a 12-hour interval (the default heat map transfer interval) for the volumes B and C data transfer.

The heat map information for the selected volumes is then periodically copied from the primary storage system to the heat map transfer utility host (default copy

period is 12 hours). The heat-map-transfer utility determines the target secondary storage system that is based on PPRC volume mapping. The utility transfers the heat-map data to the associated secondary storage systems. The heat-map data is then imported to the secondary storage system, and Easy Tier migration plans are generated based on the imported and existing heat map. Finally, the result of the heat map transfer is recorded (in memory and to a file).

To enable heat map transfer, the heat-map transfer-control switch that is on the secondary storage system needs to be enabled `-ethmtmode enabled`. This is the default mode. Use the DSCLI command **`chsi`** to enable or disable heat map transfer:

```
chsi -ethmtmode enable | disable
```

The scope of heat map transfer is determined by the Easy Tier automatic mode setting:

- To automatically transfer the heat map data and manage data placement for logical volumes in multi-tiered pools, use the Easy Tier control default settings (`-etmonitor automode`, `-etautomode tiered`).
- To automatically transfer the heat map data and manage data placement for logical volumes in all pools, use the Easy Tier control settings (`-etmonitor all`, `-etautomode all`).

Note: For PPRC relationships by using Global Mirror, Easy Tier manages data placement of the Global Copy target and FlashCopy® source only, and does not manage data placement for a FlashCopy target that is involved in the Global Mirror relationship.

If you do not have an Easy Tier license, and want to run an Easy Tier evaluation on both the primary and secondary storage systems, set the Easy Tier control on both storage systems to "monitor only" (`-etmonitor all`). The heat map transfer utility then automatically transfers the heat map data and uses this data to generate an Easy Tier report, without changing the data layout on either of the storage systems.

Chapter 2. Requirements

Installation and operating requirements are described in this section.

Supported hardware

The Easy Tier Heat Map Transfer Utility can be installed on the X86 or X86_64 platforms.

Supported operating systems

The heat map transfer utility can be installed on the following operating systems:

Windows

Microsoft Windows XP (X86), Microsoft Windows 7 (X86, X86_64)

Microsoft Windows Server 2003 (X86_64)

Microsoft Windows Server 2008 (X86_64)

Linux

Red Hat Enterprise Linux (RHEL) AS release 4 (X86, X86_64) or later

SUSE Enterprise Linux 11 (X86) or later

Networking

The host for the heat map transfer utility must have an IP network connection to every DS8000® storage system that is to be monitored by the heat map transfer utility.

Host ports

The DS Network Interface server on the Hardware Management Console (HMC) is accessed by a number of IBM applications, including the heat map transfer utility, that use a DS Network Interface client.

If your storage system is configured to conform with NIST SP 800-131A, the DS Network Interface client R7.2 and later automatically uses the NIST SP 800-131A certificate with DS8000 systems that are running R7.2 and later. The DS Network Interface client for R7.2 connects to the DS Network Interface server for R7.2 on port 1751.

If the DS Network Interface client is not enabled to support NIST SP 800-131A, the DS Network Interface server will attempt to use port 1751 first. If the connection fails, the DS Network Interface server will attempt to use port 1750. If port 1750 is disabled on the HMC R7.2, the DS Network Interface clients for R7.1.x or earlier cannot connect to the DS Network Interface server for R7.2.

Chapter 3. Easy Tier Heat Map Transfer Utility installation

The Easy Tier Heat Map Transfer Utility can be installed through the graphical, console, or unattended (silent) mode.

Download the heat map transfer utility package from IBM support: Fix Central (IBM Support: Fix Central (www.ibm.com/support/fixcentral/))

To install the Easy Tier Heat Map Transfer Utility on Linux, you must first mount the ISO installation file.

Note: The installers for the supported host systems are in the following directories:
- Linux (RedHat, SUSE): `IMAGES\HeatMapTransferUtility\Disk1\InstData\Linux\VM\install.bin`.
- Windows: `IMAGES\HeatMapTransferUtility\Disk1\InstData\Windows\VM\install.exe`.

From the command line interface, use the **-i** flag to specify a user interface mode for the installation. For instance, `-i [graphical | console | silent]`. The default installation mode is `graphical`. You do not have to specify the mode in the command unless you want to use something other than the default mode.

In console mode, type `back` to return to the previous screen, or `quit` to exit the installation. Some operating systems require restarting after installation is completed. If necessary, open a new command prompt window to start a heat map transfer utility session.

Installing the heat map transfer utility through graphical mode

You can install the heat map transfer utility on your system through the graphical mode.

To install using the graphical mode, start the setup file for your operating system located in the ISO file. You can find the platform directory containing the setup file for your operating system at `IMAGES\HeatMapTransferUtility\Disk1\InstData`

To verify the installation:
1. Check the following directories on your operating system:
   - Linux (RedHat, SUSE): `/opt/IBM/hmtu`
   - Windows (32-bit): `C:\Program Files\IBM\hmtu`
2. Change your directory to that of the application and start the heat map transfer utility through the following action according to your operating system:

   Linux (RedHat, SUSE): issue **./hmtu.sh** in the terminal.

   Windows: double-click **hmtu.exe**
3. Enter the **help** command in the utility window and ensure that the heat map transfer commands are displayed.
4. Enter the **exit** command to exit the utility window.

Installing the heat map transfer utility through console mode

You can install the heat map transfer utility on your system through the console mode.

Complete this task to install the heat map transfer utility on your system through the console mode. The console mode is primarily used for installations on a Linux operating system without an X display. You can run the installer from a command prompt on a Windows operating system.

From the command line, use the **-i** flag to specify a user interface mode for installation. For instance, `-i [graphical | console | silent]`. The default installation mode is **graphical**. You do not have to specify the mode in the command unless you want to use something other than the default mode.

While in console mode, you can type `back` to return to the previous screen, or `quit` to exit the installation. You can install the application through the graphical mode with an installation wizard. Some operating systems require restarting after installation is completed. If necessary, open a new command prompt window to start a heat map transfer utility session.

To install using the console mode:

Open a command prompt and run the installation file located in the ISO, using the "-i console" flag for console mode. For example, the Windows command is: `install.exe -i console`. You can find the setup file for your operating system at `IMAGES\HeatMapTransferUtility\Disk1\InstData`.

You can verify whether the application installed successfully on your system by using the same post-requisite steps as for the graphic mode installation.

Installing the heat map transfer utility through silent mode

You can install the heat map transfer utility on your system through the silent mode.

Using the silent mode, you can install the application from the command-line interface without prompts or feedback by using the predefined settings included in a saved configuration file.

Use the following steps to install silent mode on either the Linux or Windows operating system:

1. Open a command prompt as an administrator.
2. Depending on your operating system (Linux or Windows), create a properties file by using information that is similar to the following sample `install.properties` file.

   Linux

   ```
   [root@x3650-07 itso_admin]# more install.properties
   # This file was built by the Replay feature of InstallAnywhere.
   # It contains variables that were set by Panels, Consoles or Custom Code.
   #Indicate whether the license agreement been accepted
   #----------------------------------------------------
   LICENSE_ACCEPTED=TRUE
   #Choose Install Folder
   #---------------------
   USER_INSTALL_DIR=/opt/IBM/hmtu
   ```

```
#Choose Link Location
#-------------------
USER_SHORTCUTS=/root
[root@x3650-07 itso_admin]#
```

Windows

```
# Mon May 27 12:24:20 CST 2013
# Replay feature output
# ---------------------
# This file was built by the Replay feature of InstallAnywhere.
# It contains variables that were set by Panels, Consoles or
  Custom Code.
#Indicate whether the license agreement been accepted
#-----------------------------------------------------
LICENSE_ACCEPTED=TRUE
#Choose Install Folder
#---------------------
USER_INSTALL_DIR=C:\\Program Files (x86)\\IBM\\hmtu
#Choose Shortcut Folder
#----------------------
USER_SHORTCUTS= C:\\Users\\IBM_ADMIN\\AppData\\Roaming\\
Microsoft\\Windows\\Start Menu\\Programs\\hmtu
```

3. Run the installation file in the ISO download, by using the **-i silent -f** flag for silent mode. For example:

   Linux

   a. Issue this command:

   ```
   ./install.bin -i silent -f /home/itso_admin/install.properties
   ```

   b. Wait for the installation process to complete, as shown in the following example.

   ```
   root@x3650-07: ./install.bin -i silent -f /home/itso_admin/
   install.properties
   Preparing to install...
   Extracting the JRE from the installer archive...
   Unpacking the JRE...
   Extracting the installation resources from the installer
   archive...
   Configuring the installer for this system's environment...
   Launching installer...
   Preparing SILENT Mode Installation...

   ============================================================
   hmtu                              (created with InstallAnywhere)
   ------------------------------------------------------------
   ============================================================
   Installing...
   -------------
   [================|================|==================]
   [----------------|----------------|------------------]

   Installation Complete.
   root@x3650-07:
   ```

   Windows

   Issue this command:

   ```
   install.exe -i silent -f "C:\Users\IBM_ADMIN\install.properties"
   ```

4. Optionally, a configuration file can be generated in a non-silent mode. You can then use this configuration file in subsequent silent installations. Use the following steps to collect and modify the saved installation options:

   a. Issue the setup command by using the **-r** *outputfile* option. For example, install.exe -r "<user folder>\install.properties" This generates a sample of the installation option file, the install.properties in this example, including all installation settings.

b. Modify the settings in the `install.properties` file as needed.

c. Use this generated configuration file for future installations by entering: **-f** *outputfile* to designate the input properties files as described above.

Chapter 4. Easy Tier Heat Map Transfer Utility operations

After you install the heat map transfer utility, you are ready to start using the utility.

Use this procedure and examples as guides to help you use the heat map transfer utility commands in your environment.

1. Issue the **adddev** command to make your primary and secondary DS8870 systems known to the heat map transfer utility.

   a. hmtu> adddev -hmc1 *9.111.14.48* -user *admin* -passwd *passw0rd* -dev *IBM.2107-75ZA571*

      The following output displays:

      ```
      Date/Time: 2013-03-27 11:20:48 IBM HMTU Version: 7.7.10.207
      GUSS00000I The device <id = IBM.2107-75ZA571> was added successfully.
      ```

   b. hmtu> adddev -hmc1 *9.111.14.49* -user *admin* -passwd *passw0rd* -dev *IBM.2107-75ZA181*

      The following output displays:

      ```
      Date/Time: 2013-03-27 11:21:49 IBM HMTU Version: 7.7.10.207
      GUSS00000I The device <id = IIBM.2107-75ZA181> was added successfully.
      ```

2. Issue the **manageserver** command to start the process of managing your heat map data automatically.

   a. hmtu> manageserver -action start

      The following output displays:

      ```
      Date/Time: 2013-03-27 11:23:41 IBM HMTU Version: 7.7.10.207
      GUSS00004I The Heat Map Transfer server is started.
      ```

3. Issue the **lsdev** command to check the connection status of your storage systems.

   a. hmtu> lsdev -checkconn

      The connection status should display Running:

      ```
      Date/Time: 2013-03-27 11:24:11 IBM HMTU Version: 7.7.10.207
      DevId                 HMC1              HMC2      User        ConnStatus
      ================================================================================
      IBM.2107-75ZA571      9.111.14.48                 admin         Running
      IBM.2107-75ZA181      9.111.14.49                 admin         Running
      ```

   b. Issue the **showserver** command to display when the next heat map data transfer will occur.

      The following output displays:

      ```
      Date/Time: 2013-03-27 11:24:42 IBM HMTU Version: 7.7.10.207
      ServerStartTime              2013-03-27 11:23:39
      ServerRunningStatus          Sleeping
      XferInterval(min)            720
      NextXferStartTime(Estimated) 2013-03-27 14:25:00
      ```

4. After the first heat map transfer is complete, issue the **lshmt** command to check the heat map data transfer results.

The following output displays (shown as separate results for space considerations):

```
Date/Time: 2013-03-27 14:55:15 IBM HMTU Version: 7.7.10.207

PrimaryDev       SecondaryDev     TotalXferTimes SuccessfulXferTimes FailedXferTimes
====================================================================================
IBM.2107-75ZA571  IBM.2107-75ZA181      1              1                   0


 LastResult       LastStartTime      LastDuration(sec)
====================================================================================
 SUCCESS         2013-03-27 14:30:09       239
```

5. Issue the **manageserver** command to initiate an immediate transfer operation instead of waiting for the next scheduled automatic transfer to occur.

   a. `hmtu> manageserver -action xfer`

      The following output displays:

      ```
      Date/Time: 2013-03-27 14:56:14 IBM HMTU Version: 7.7.10.207
      GUSS00005I The Heat Map Transfer is started.
      ```

      Otherwise, the automatic heat map data transfer is processed, by default, every 12 hours. The **showserver** command displays the heat map transfer status:

      ```
      Date/Time: 2013-03-27 15:38:29 IBM HMTU Version: 7.7.10.207
      ServerStartTime              2013-03-27 11:23:39
      ServerRunningStatus          Sleeping
      XferInterval(min)            720
      NextXferStartTime(Estimated) 2013-03-28 02:30:00
      ```

Note: The Storage Tier Advisor Tool (STAT), when applied to the secondary DS8870 system, will display the Learning Strategy status as "Base on Remote" (as shown in Figure 2 on page 13) for the respective replication target volumes.

Volume Heat Distribution

Volume ID *8	Learning Strategy *9	Configured Size *10	IO Percentage of Extent Pool
0x4610	Base on Remote	15GiB	0.17%
0x4611	Base on Remote	15GiB	0.00%
0x4612	Base on Remote	15GiB	1.37%
0x4660	Base on Remote	32GiB	0.84%
0x4661	Base on Remote	32GiB	0.81%
0x4662	Base on Remote	32GiB	0.86%
0x4663	Base on Remote	32GiB	0.84%
0x4664	Base on Remote	29GiB	0.78%
0x4665	Base on Remote	29GiB	0.79%
0x4666	Base on Remote	31GiB	7.02%

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*8. Volume ID represents the DS8000 volume ID, which is generated when the volume is created.

*9. Learning Strategy displays the specific learning data used by this volume.

- N/A indicates that the volume applies learning data based on its own learning results.
- Based on remote indicates that the volume applies learning data transferred from a remote storage device.

Figure 2. Volume Heat Distribution information

Chapter 5. CLI Commands

This section contains commands for the operation of the Easy Tier Heat Map Transfer Utility.

The following commands are available:

adddev The **adddev** command adds a storage system to the heat map transfer utility.

chdev The **chdev** command modifies the heat map transfer utility for a storage system.

chserver
The **chserver** command sets a starting time for heat map transfer utility transfer operations to begin.

exit | quit
The **exit** or **quit** command ends the current heat map transfer utility session.

help The **help** command allows you to list detailed usage information about the specified heat map transfer utility command.

lsdev The **lsdev** command lists the configuration and status information of all the storage systems managed by the heat map transfer utility.

lshmt The **lshmt** command queries and displays the data transfer results for the peer-to-peer remote client relationships (PPRC) that are defined for the storage system.

manageserver
> The **manageserver** command issues a heat map transfer utility service start, stop or immediately initiates a transfer operation.

rmdev The **rmdev** command removes a storage system from heat map transfer utility management.

showserver
> The **showserver** command displays the status of the heat map transfer utility service.

ver The **showserver** command displays the version of the heat map transfer utility.

For information about heat map transfer messages, see the IBM DS8000 series online product documentation(www.ibm.com/support/knowledgecenter/ST8NCA/product_welcome/ds8000_kcwelcome.html).

adddev

The **adddev** command adds a storage system to the heat map transfer utility. Once added, heat map data is transferred to or from the storage system, if valid peer-to-peer remote client relationships (PPRC) exist for the storage system. The connection to the storage system is not tested.

```
►►── adddev─┬─────────┬──── -dev── dev_id──────────────────────────────────────►
            ├─ -help ─┤
            ├─ -h ────┤
            └─ ? ─────┘

►── -hmc1── hmc1_addr─┬────────────────────┬── -user── name── -passwd── password──────────►◄
                      └─ -hmc2── hmc2_addr ─┘
```

Parameters

-help │ -h │ -?
> (Optional) Displays heat map transfer utility help for this command.

-dev *dev_id*
> (Required) Specifies the identifier of the storage facility image.

-hmc1 *hmc1_addr*
> (Required) Specifies the IP address of the hardware management console (HMC) for the storage system.

-hmc2 *hmc2_addr*
> (Optional) Specifies the IP address of a secondary HMC) for the storage system.
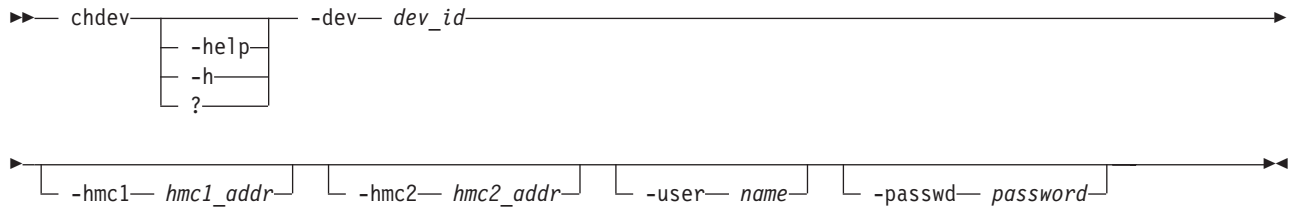
-user *name*
> (Required) Specifies the name of the user authorized to log into the storage system.

-passwd *password*
> (Required) Specifies the password of the user authorized to log into the storage system.

chdev

The **chdev** command modifies an existing storage system that is under management of the heat map transfer utility. Use the **chdev** command to update the heat map transfer utility when the connection information for the storage system has changed.

```
►►── chdev ──┬──────┬── -dev── dev_id ──────────────────────────────────►
             │ -help│
             ├ -h ──┤
             └ ? ───┘

►──┬──────────────────────┬──┬──────────────────────┬──┬─────────────┬──┬───────────────────────┬──►◄
   └ -hmc1── hmc1_addr ────┘  └ -hmc2── hmc2_addr ────┘  └ -user── name┘  └ -passwd── password ───┘
```

Parameters

-help | *-h* | *-?*
> (Optional) Displays the heat map transfer utility help for this command.

-dev *dev_id*
> (Required) Specifies the identifier of the storage facility image.

-hmc1 *hmc1_addr*
> (Optional) Specifies the IP address of the hardware management console (HMC) for the storage system.

-hmc2 *hmc2_addr*
> (Optional) Specifies the IP address of a secondary HMC for the storage system.
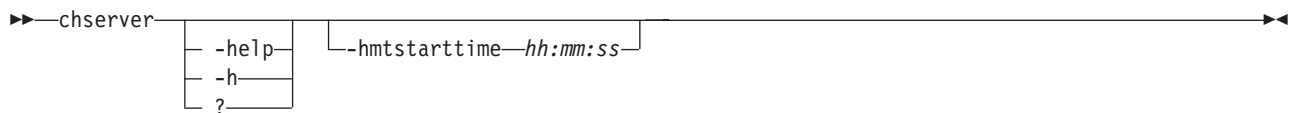
-user *user_name*
> (Optional) Specifies the name of the user authorized to log into the storage system.

-passwd *user_password*
> (Optional) Specifies the password of the user authorized to log into the storage system.

chserver

The **chserver** command sets the starting time for the heat map transfer utility transfer operations to begin. By default, the initial transfer operation begins twelve hours after the heat map transfer service is started.

```
►►── chserver ──┬──────┬──┬────────────────────────────┬──►◄
                │ -help│  └ -hmtstarttime── hh:mm:ss ───┘
                ├ -h ──┤
                └ ? ───┘
```

Parameters

-help | *-h* | *-?*
> (Optional) Displays the heat map transfer utility help for this command.

-hmtstarttime *hh:mm:ss*
> (Required) Specifies the time (24-hour format) for heat map transfer utility transfer operations to begin.

exit | quit

The **exit** or **quit** command ends the current heat map transfer utility session.

```
►►──┬─exit─┬──────────────────────────────────────────────────────────►◄
    └─quit─┘
```

help

The **help** command allows you to list detailed usage information about the specified heat map transfer utility command.

```
►►── help──┬── adddev───────┬──────────────────────────────────────────►◄
           ├─ chdev─────────┤
           ├─ chserver──────┤
           ├─ exit──────────┤
           ├─ lsdev─────────┤
           ├─ lshmt─────────┤
           ├─ manageserver──┤
           ├─ quit──────────┤
           ├─ rmdev─────────┤
           ├─ showserver────┤
           └─ ver───────────┘
```

Parameters

-command_name
    (Optional) Specifies the command for which detailed usage information is needed.

lsdev

The **lsdev** command lists the connection and status information of all storage systems managed by the heat map transfer utility.

```
►►──lsdev──┬───────┬──┬─────────────┬──────────────────────────────────►◄
           ├─-help─┤  └─ -checkconn─┘
           ├─-h────┤
           └─?─────┘
```

Parameters

-help | -h | -?
    (Optional) Displays the heat map transfer utility help for this command.

-checkconn
    (Optional) Indicates whether to query the system for the connection status and display the result. If unspecified, a dash ("-") is displayed as the value for the ConnStatus (connection status) field.

Example: `lsdev –checkconn`

```
DevId              HMC1          HMC2          ConnStatus   UserName
IBM.2107-75NR551   address.com   address.com   Running      admin
```

Report field definitions for ConnStatus (connection status)

Running
>Indicates that the storage system is connected with heat map transfer enabled.

-
>Indicates that the heat map transfer utility does not query the connection status from the heat map transfer service.

Not Available
>Indicates that the heat map transfer feature is not enabled on the storage system. This can be due to the heat map transfer feature being disabled or not installed, or the Easy Tier feature disabled.

Authentication fail
>Indicates that the connection was established but the specified user name or password criteria was invalid.

Cannot connect
>Indicates that a connection to the storage system could not be established because the host cannot be reached.

IP Invalid
>Indicates that either the IP address (hmc1) or the secondary IP address (hmc2) are not assigned to the same storage system.

DevId Invalid
>Indicates that the identifier provided for the storage facility image is not consistent with the actual one of the storage system.

Invalid
>Indicates that a connection cannot be established to the storage system for other, unknown reasons.

lshmt

The **lshmt** command issues a query to the heat map transfer utility for the data transfer results for all of the peer-to-peer remote copy (PPRC) relationships being monitored by the heat map transfer utility. The resulting report is then displayed. Use the lshmt command to audit or troubleshoot heat map transfers.

```
►►─lshmt─┬──────────┬──────────────────────────────────►◄
         ├─ -help ──┤
         ├─ -h ─────┤
         └─ ? ──────┘
```

Example: lshmt

```
Date/Time: 2013-02-25 15:31:04   IBM HMTU: 1.0.0.0
PrimaryDev          IBM.2107-75ZH551
SecondaryDev        IBM.2107-75ZH551
TotalXferTimes      1
SuccessfulXferTimes 1
FailedXferTimes     0
LastResult          SUCCESS
LastStartTime       2013-03-21
lastDuration(sec)   19:57:53 364
```

Report field definitions

PrimaryDev
Indicates the identifier of the storage facility image of the primary site.

SecondaryDev
Indicates the storage facility image ID of the secondary site.

TotalXferTimes
Indicates the total number of data transfers within the PPRC relationship.

SuccessfulXferTimes
Indicates the total number of successful data transfers within the PPRC relationship.

FailedXferTimes
Indicates the total number of failed data transfers within the PPRC relationship.

LastResult
A shortened name indicating the success or failure of the last data transfer. (See Table 1 for these names and explanations.)

LastStartTime
Indicates the last data transfer start time.

LastDuration
Indicates the last data transfer stop time and duration (in seconds).

Result codes

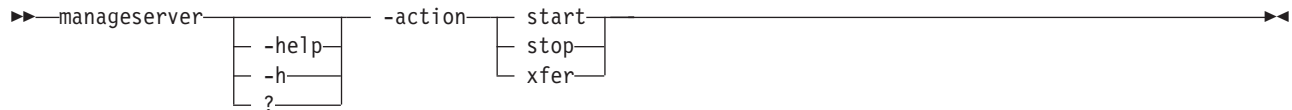*Table 1. Result codes and explanations for lshmt command output.*

Code	Explanation
SUCCESS	Data transfer successful.
UNKNOWN	An unknown error occurred.
INVALID_SRC	Invalid source device.
INVALID_TGT	Invalid target device.
CON_SRC_FAIL	Source device connection failed. For more information, see "lsdev" on page 16 lsdev -checkconn.
CON_TGT_FAIL	Target device connection failed. For more information, see "lsdev" on page 16 lsdev -checkconn.
PULL_FAIL	The attempt to import the heat map data from the primary storage system failed.
PUSH_FAIL	The attempt to export the heat map data to the secondary storage system failed.
SRC_DATA_INVALID	The heat map data from the primary storage system failed validation.
TGT_DATA_INVALID	The results of the heat map transfer to the secondary storage system were invalid.
SRC_NOT_SUPPORT	The source device does not support the heat map transfer feature.
TGT_NOT_SUPPORT	The target device does not support the heat map transfer feature.
TIME_OUT	A timeout occurred during the heat map transfer.
PPRC_NOT_EXIST	The storage system does not have a peer-to-peer remote client (PPRC) relationship.

Table 1. Result codes and explanations for lshmt command output. (continued)

Code	Explanation
PPRC_INVALID	The current peer-to-peer remote client (PPRC) relationship for the storage system is invalid.

manageserver

The **manageserver** command processes a heat map transfer utility service start, stop, or transfer operation.

```
►►─manageserver──┬──────────┬──  -action──┬─ start ───────────────────────────────►◄
                 ├─ -help ──┤             ├─ stop ──┤
                 ├─ -h ─────┤             └─ xfer ──┘
                 └─ ? ──────┘
```

Parameters

-help │ -h │ -?
> (Optional) Displays the heat map transfer utility help for this command.

-action
> (Required) Indicates that the following keyword is a heat map transfer utility action to be performed. One of the optional commands must be specified.

start
> (Optional) Starts the heat map transfer service. The peer-to-peer remote copy (PPRC) relationships are automatically detected.
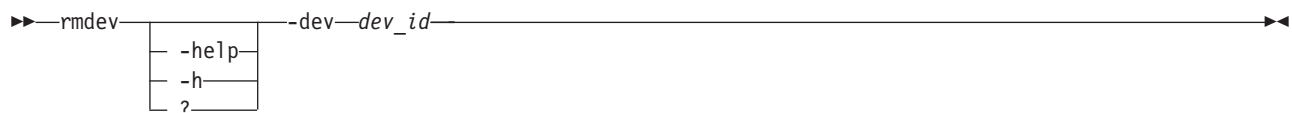
stop
> (Optional) Stops the heat map transfer service.

xfer
> (Optional) Immediately initiates a heat map transfer operation. If the heat map transfer service is not running (the start command has not been issued), an error message is returned. If the heat map transfer service is currently doing a transfer, the transfer request is ignored and an error message returned. By default, the initial transfer operation begins twelve hours after the heat map transfer service is started.

rmdev

The **rmdev** command removes a storage system from management by the heat map transfer utility. Once removed, heat map data no longer will be transferred to or from the storage system.

```
►►─rmdev──┬──────────┬──  -dev──dev_id───────────────────────────────────────────►◄
          ├─ -help ──┤
          ├─ -h ─────┤
          └─ ? ──────┘
```

Parameters

-help │ -h │ -?
> (Optional) Displays the heat map transfer utility help for this command.

-dev *dev_id*

(Required) Specifies the identifier of the storage facility image to be removed.

showserver

The **showserver** command displays the current status of the heat map transfer utility service. The fields displayed are: serverStartTime, xferInterval, nextXferStartTime, and serverRunningStatus. The serverRunningStatus values can be: sleeping, inactive, or xfer in progress.

```
►►─showserver─┬──────┬──────────────────────────────────────────►◄
              ├─-help─┤
              ├─-h───┤
              └─?────┘
```

Example: showserver

```
Date/Time: 2013-03-21 20:23:11 IBM HMTU Version: 7.7.10.214
ServerStartTime 2013-03-21 19:57:39
ServerRunningStatus Sleeping
XferInterval(min) 720
NextXferStartTime(Estimated) 2013-03-22 07:57:39
```

Report field definitions

ServerStartTime

The time the heat map transfer service started.

ServerRunningStatus

The heat map transfer service running status can be any of the following:

- In Progress
  Indicates that a heat map transfer is currently in progress.
- Sleeping
  Indicates that the heat map transfer service is waiting for the next heat map transfer.
- Inactive
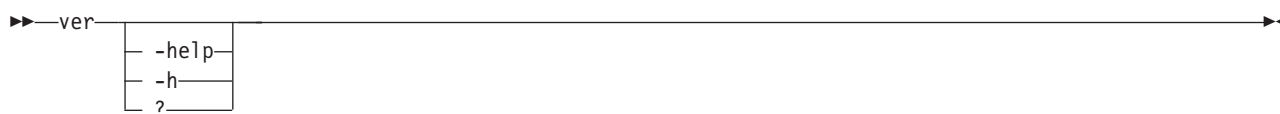 Indicates that the heat map transfer service is not started.

XferInterval

The number of minutes until the next heat map transfer. The default time is 12 hours (720 minutes).

NextXferStartTime

The estimated time of the next heat map transfer.

ver

The **ver** command displays the version of the Heat Map Transfer Utility.

```
►►─ver─┬──────┬──────────────────────────────────────────────────►◄
       ├─-help─┤
       ├─-h───┤
       └─?────┘
```

Example: ver

```
Date/Time: 2013-03-21 17:03:12 IBM HMTU Version: 7.7.10.191
IBM Heat Map Transfer 7.7.10.191
```

Chapter 6. Uninstalling the heat map transfer utility

You can uninstall the heat map transfer utility from your system.

For Windows, you can optionally use the **Add/Remove Programs** tool to remove the heat map transfer utility from your system.

The uninstaller program is located in the installation directory. Use the Uninstall command to remove the heat map transfer utility.

From the command-line interface, enter the directory path, the `Uninstall` command, and (optionally) the parameter **-i** to specify an uninstall mode (`graphical`, `console`, or `silent`). If the **-i** parameter is not specified, the uninstall mode defaults to graphical mode. For example, to uninstall the heat map transfer utility from Windows using silent mode, the command is: *installation_directory*/`Uninstall hmtu.exe -i silent`.

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