Tina Drivers Documentation

Tina 4.8

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Contents

CHAPTER 1 - Concepts

The introductory topics Definitions and Remarks, Split Libraries, Passthru Drivers, and Frequently Asked Questions present a few important concepts for the comprehension and use of Tina drivers. Among these are, the splitting of libraries which enables different catalogs to use the same library, and the concept of *passthru* drivers that enables interfacing with devices on some operating systems.

> **Important**: The procedures and manipulation described in this guide often require that you are an operating system super-user. Log in either as `root` or *administrator*, according to your operating system, and be cautious during manipulation since you can damage your system when modifying certain files.

> **Important**: Although the new Web Administration Console is used to perform most of the operations in Tina, references to the old Web Administration Interface may still be present in this guide. These parts will be progressively updated in future versions of Tina.

Definitions and Remarks

Libraries

A library, or robot is a peripheral designed to manage storage media such as tapes or optical disks.

A library usually contains these elements:

- **Slots.** The media storage places.
- **Drives.** Medium reading and writing devices.
- **Mailbox slots.** Special slots used to put media in and out of the library.
- **One or more pickers.** Automated arms moving the media to and from slots, drives and mailboxes.

Tina fully automated backup solution handles the libraries through a specific driver: the `qc` library driver, freeing you from the task of managing storage media. The qc library driver can be a kernel driver (e.g., AIX), or can use the passthru driver of an operating system (e.g., Linux).

For some operating systems, Tina uses operating systems native Passthru Drivers.

Drives

A drive is a media read write device. The main drive types are the tape drives, the magneto-optical drives, and the virtual drives on disk. Only tape drives and magneto-optical drives need a driver.

A drive must meet these requirements for Tina to be able to use it correctly:

- When the option is available, the drive must be a no-rewind device.
- On Unix operating systems, the drive block size must be variable.

> **Note**: Whereas tape drives are managed by operating systems drivers, optical disks drives are managed by Atempo's `oc` driver.

Split Libraries

You can split a physical library into several logical libraries.

A physical library is characterized by these three component types:

- **Drives.** Numbered from `0` to `n-1` for *n* drives.
- **Slots.** Numbered from `0` to `n-1` for *n* slots.
- **Mailboxes.**

You can only assign drives and slots to a logical library.

Split Syntax

This is the split syntax:

```
(drives|slots)(drives|slots)...
```

Where: `(drives|slots)` is a logical library
`drives` are the drive number(s) assigned to the logical libraries
`slots` are slot numbers assigned to the logical libraries

Syntax rules:

- Items in a list are separated by a comma ",".
- The beginning and end of an array are separated by a hyphen "-".
- Mailboxes are implicitly shared and do not display in the split definition.
- Spaces and tabs are authorized.
- Items within a logical library must be arranged in ascending order.

> **Important**: A physical library component can only be assigned to a single logical library; however, you can actually share drives between several logical libraries with Tina Library Sharing Manager. In that case, you can assign a single drive to several logical libraries.

For further information concerning drive sharing, see the Managing Simultaneous Access to Library Shared Drives topic in the Device & Media Management topic of the Tina Administration Documentation.

Example.

`....qc_split=(0|0-5)(1,2|6-17, 20)` represents two logical libraries.

The first one has been assigned drive `0`, and six slots: slots `0` to `5`.

The second library has been assigned drives `1` and `2`, and thirteen slots: slots `6` to `17` and slot `20`.

> **Note**: You can define up to `16` logical libraries per physical library.

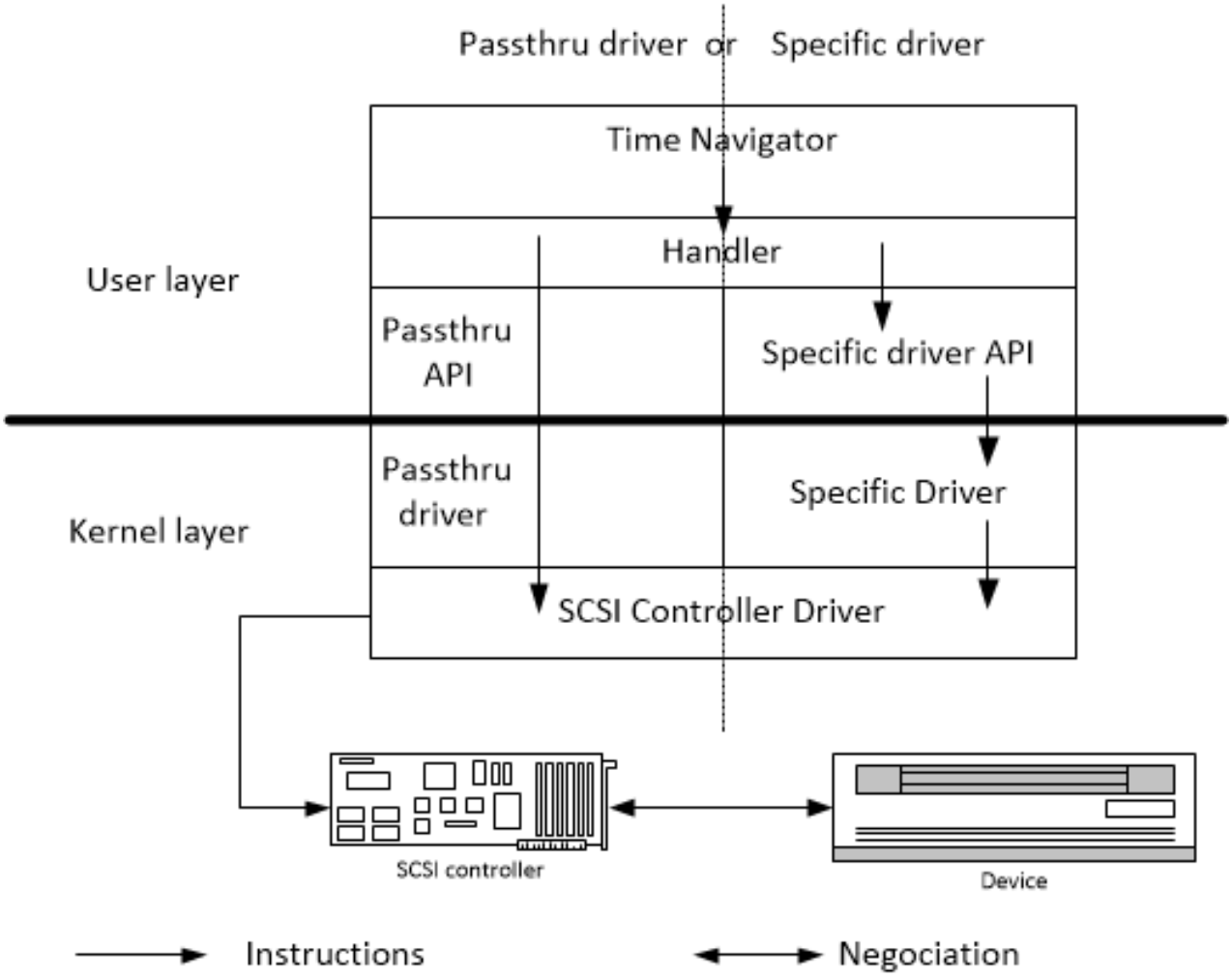
Passthru Drivers

A passthru driver is an operating system native driver used to enable communication between a user process and a controller driver. It receives orders from the user process and redirects them towards the controller, thus enabling communication between a user process and a peripheral.

A specific driver interprets and structures the orders in SCSI commands before sending them whereas a passthru driver only sends prestructured orders. It is the user process which structures the orders. Passthru drivers do not interpret commands, they only transmit them.

In the case of libraries or optical disks used by Tina, the passthru driver receives instructions (SCSI commands) from Tina through an API and sends them to the SCSI controller driver which in turn decodes the instructions to be able to manage the SCSI controller connected to the device.

This image illustrates the passthru driver:



Frequently Asked Questions

Is my SCSI Device Supported by the Tina Drivers?

These commands (depending on the operating system) give a result.

- On IBM AIX systems, run this command:

```
#strings <driver> | grep <device_inquiry>
```

- On over UNIX systems, run this command:

```
#strings <qcdiag> | grep <device_inquiry>
```

- On Windows systems, run this command:

```
c:\> find "<device_inquiry>" qcdiag
```

CHAPTER 2 - Windows

This topic concerns the Windows operating system. System-specific information is provided whenever applicable.

> **Note**: Refer to the Time Navigator Compatibility Guide for more information on the supported operating systems.

Tape Library Device Management

Two issues can arise:

- The device may not display in the registry because the system hides the key (unable to recognize the device).
- Tina does not support manufacturer tape library driver. If a tape library is not recognized as an unknown medium changer, it should be updated to a unknown medium changer.

For these two issues, use this procedure:

1. Select Start › Administrative Tools › Computer Management.
2. Select Device Manager in the left window.
3. Open the Medium changer sub-tree in the right window.
4. Right-click the non-recognized device name and select Properties.
5. Select the Driver tab, click Update driver, then click Next.
6. Select Display a list of the known drivers for this device so that I can choose a specific driver and click Next.
7. Select Other device and click Next.
8. Select Unknown Medium Changer device in the list and click Next.
9. Click Next in the Warning window.
10. Click Finish.

Tape Drive Device Management

Ensure that devices are fully recognized by the operating system, and have a functional driver.

1. Select Start › Administrative Tools › Computer Management.
2. Select Device Manager in the left window.
3. Open the Tape drives sub-tree in the right window.
4. Check that all the tape drives are listed in this sub-tree without any exclamation mark.

- If some tape drives are not recognized, update the driver.
- If Windows does not natively support the tape drive, contact your drive manufacturer.

How to Activate Persistent Naming

To activate persistent naming

1. Click Start ›} Run, type `regedit`, then click OK.
2. Locate and then click the following registry subkey:
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Tape
3. Select Edit ›} New ›} DWORD Value.
4. Type Persistence, then press ENTER.
5. Right-click the Persistence registry entry, then click Modify.
6. Type 1 in the Value data box, then click OK.
7. Quit Registry Editor.
8. Restart the computer.

For Windows 2003, consult the https://support.microsoft.com/en-us/kb/873337 technical note:

How to Check Detection of Devices that can be Managed by Tina

The devdrvconfig.exe binary is used by Tina to detect devices.

Example.

```
C:>devdrvconfig.exe
Version=1.0
====================
Device Type=Tape drive
Device Descriptor=Tape0
Configured=Yes
Vendor Identification=HP
Product Identification=Ultrium 2-SCSI
Product Revision Level=kn77
Tape Drive Serial Number=HU123456P3
Number of Tina drive type for this device=1
Tina type value for this drive=44
====================
Device Type=Medium changer
Device Descriptor=spt_c7b0t1l0
Configured=No
Vendor Identification=HP
Product Identification=1x8 G2 AUTOLDR
Product Revision Level=kn77
Library Serial Number=HU123456P7
Number of slots=8
Number of drives=1
Number of mailbox slots=1
Drives Serialization=Yes
Serial number for drive index0=HU123456P3
Number of Tina library type for this device=1
Tina type value for this library=240
Split=No
====================
```

```
C:>
```

How to Manually Configure Tape Library Devices for Tina

This configuration should be done before any declaration in Tina Web Administration.

It creates or updates configuration files (one for each library) in the `C:\conf_drv` directory.

```
C:> devdrvconfig.exe  -c mc
Serial number HU123456P7 should be configured
Configuring Serial number HU123456P7
Configuration file C:\conf_drv\c7b0t1l0.conf created.
Device Type=Medium changer
Device Descriptor=spt_c7b0t1l0
Configured=Yes
OS Device Path=\\.\scsi7:
OS SPT Device Path=\\.\scsi7:
Vendor Identification=HP
Product Identification=1x8 G2 AUTOLDR
Product Revision Level=kn77
Library Serial Number=HU123456P7
Number of slots=8
Number of drives=1
Number of mailbox slots=1
Drives Serialization=Yes
Serial number for drive index0=HU123456P3
Number of Tina library type for this device=1
Tina type value for this library=240
Tina type name for this library=HP StorageWorks 1x8 G2
Split=No
====================

C:>
```

Manual Configuration in Time Navigator Web Administration

When manually declaring devices in Tina Web Administration, the device descriptor field is the one listed by the devdrvconfig.exe binary.

Example.

```
Device Descriptor=Tape0 (for Tape Drive Device)
Device Descriptor=spt_c7b0t1l0 (for Tape Library Device)
```

CHAPTER 3 - macOS

The topics Common Library and Tape Drive Configuration, Specific Library Configuration, and Specific Tape Drive Configuration concern the macOS operating system. System specific information is provided whenever applicable.

> **Note**: Refer to the Time Navigator Compatibility Guide for more information on the supported operating systems.

Useful information

To list all devices available to the operating system, run this command:

```
# ioreg
```

Or

```
# system_profiler
```

To display the last kernel messages, run this command:

```
# dmesg
```

Common Library and Tape Drive Configuration

Using devdrvconfig Configuration Tool

You use the `devdrvconfig` tool to create the configuration files necessary to use the qc and tape driver on macOS. It scans the macOS I/O registry to find the tape and medium changer devices and create a configuration file in the `/Library/Application Support/Atempo/conf_drv` directory for each device found.

Usage

To probe all SCSI tape devices and all SCSI Medium-Changer, run this command:

```
# devdrvconfig -s tape_mc
```

To probe all SCSI tape devices, run this command:

```
# devdrvconfig -s tape
```

To probe all SCSI medium changers devices, run this command:

```
# devdrvconfig -s mc
```

To configure all SCSI tape devices and all SCSI Medium-Changer, run this command:

```
# devdrvconfig -c tape_mc
```

To configure all SCSI tape devices, run this command:

```
# devdrvconfig -c tape
```

To configure all SCSI medium changers devices, run this command:

```
# devdrvconfig -c mc
```

To delete all SCSI tape devices and all SCSI Medium-Changer, run this command:

```
# devdrvconfig -d tape_mc
```

To delete all SCSI tape devices, run this command:

```
# devdrvconfig -d tape
```

To delete all SCSI medium changers devices, run this command:

```
# devdrvconfig -d mc
```

Use `devdrvconfig -h` to find out all possible options.

Operating System Requirement

The qc driver is supported from the release 10.7 of macOS.

Naming Medium Changer Devices

Device naming for medium changers is `qc<instance number>s<split number>`. For instance, `qc0s0` or `qc1` in case of no associated split.

Associated configuration files are named `qc<instance number>.conf` and located in the `/Library/Application Support/Atempo/conf_drv` directory.

Naming Tape Devices

Device naming for tape devices is `tape<instance number>`, for instance, `tape0`, `tape1`, and so on.

Associated configuration files are named `tape<instance number>.conf` and located into the `/Library/Application Support/Atempo/conf_drv` directory.

Specific Library Configuration

The configuration file contains '`key` = `value`' lines.

Useful string parameters are `emulate` and `split`.

These are the possible options:

- `emulate` = "<inquiry>"
  Known library's inquiry which have the same behavior. Useful for unknown library. The default value is `none`.
- `split` = "<split-info>"
  How to split the library into several logical libraries. The default value is `empty`.

> **Note**: If your environment contains complex configuration files (e.g., library with a split), during the upgrade you must manually move the files from the `/etc/conf_drv` directory to the `/Library/Application Support/Atempo/conf_drv` directory.

Syntax

The syntax is (drives|slots)(drives|slots)...

- Separator is ",".
- A range is represented by "-".
- The mailbox is shared (nothing to specify).
- Space and tab are `ed`.
- Use increasing order.

Example of a split library that emulated an Scalar i500

This is an example of the `/etc/conf_drv/qc0.conf` file:

```
# Begin Time Navigator setup
# Auto generated data, do not modify !
Device Type = Medium changer
Device Logical Name = qc0
Device path =
IOService:/MacRISC4PE/ht@0,f2000000/AppleMacRiscHT/pci@1/IOPCI2PCIBridge/ATT
O,ExpressPCIProUL4D@3/ATTOUl4Controller/IOSCSIParallelInterfaceDevice@3/IOSC
SITargetDevice/IOSCSILogicalUnitNub@0
Serial Number = 11011219
Vendor Identification = DELL
Product Identification = ML6000
Product Revision Level = 1.00
# End of auto generated data
# Parameters
# debug = 0 or 1 or 2
# split = split-info
split = (0,1|1-5)(0,1|8-10)
# emulate = inquiry
emulate = "Scalar i500"
# See qc driver documentation
# End Time Navigator setup
```

Specific Tape Drive Configuration

The configuration file contains '`key` = `value`' lines.

The useful string parameter is `timeout`.

The `timeout` parameter contains the value used for the timeout setting for each SCSI command. This value is a number of seconds.

`timeout` = `600` (i.e., `600` seconds).

Example. This is an example of a tape drive configuration:

```
# Begin Time Navigator setup
# Auto generated data, do not modify !
Device Type = Tape drive
Device Logical Name = tape0
Device path =
IOService:/MacRISC4PE/ht@0,f2000000/AppleMacRiscHT/pci@1/IOPCI2PCIBridge/ATT
O,ExpressPCIProUL4D@3/ATTOUl4Controller/IOSCSIParallelInterfaceDevice@1/IOSC
SITargetDevice/IOSCSILogicalUnitNub@0
Serial Number = 9110138050
SCSI Logical Unit Number = 0
Vendor Identification = IBM
Product Identification = ULTRIUM-TD2
Product Revision Level = 4772
# End of auto generated data
# Parameters
# debug = 0 or 1 or 2
# End Time Navigator setup
```

CHAPTER 4 - Linux

The topics Library Driver and Tape Drive concern the Linux operating systems. System specific information is provided whenever applicable.

> **Note**: Refer to the Time Navigator Compatibility Guide for more information on the supported operating systems.

Kernel Requirements

The Linux Kernel should have these features enabled:

- Enable loadable module support
- SCSI support
- SCSI tape support
- SCSI generic support
- /proc file-system support
- mt-st package installed
- standard UDEV rules (modification of tape or medium-changer SCSI devices rules can hinder device detection of Time Navigator)

Useful Commands

- List all probed SCSI devices:
  `cat /proc/scsi/scsi`
- List all loaded modules:
  `/sbin/lsmod`
  or
  `cat /proc/modules`
- Display last kernel messages:
  `dmesg`
- View all messages
  `view /var/log/messages`

Library Driver

Manual Procedures

Usage

To probe all SCSI medium changers devices:

```
# devdrvconfig -s mc
```

To configure all SCSI medium changers devices:

```
# devdrvconfig -c mc
```

To delete all SCSI medium changers devices:

```
# devdrvconfig -d mc
```

Use `devdrvconfig -h` to find out all possible options.

Specific Library Configuration

The configuration file contains `key = value' lines.

Useful string parameters are `emulate' and `split'.

Possible options are:

emulate = "<inquiry>"

Known library's inquiry which have the same behavior. Useful for unknown library. (default none).

split = "<split-info>"

How to split the library into several logical libraries (default empty).

Syntax: (drives|slots)(drives|slots)...

- separator is ",".
- a range is represented by "-".
- the mailbox is shared (nothing to specify)
- space and tab are ed
- use increasing order

Example of a split library that emulated a Scalar i500

File /etc/conf_drv/qc0.conf:

```
# Begin Time Navigator setup
# Auto generated data, do not modify !
Device Type = Medium changer
Device Logical Name = qc0
Device path = /dev/tape/by-id/scsi-1234567-changer
Serial Number = 11011219
Vendor Identification = DELL
Product Identification = ML6000
Product Revision Level = 1.00
# End of auto generated data
# Parameters
# debug = 0 or 1 or 2
# split = split-info
split = (0,1|1-5)(0,1|8-10)
# emulate = inquiry
emulate = "Scalar i500"
# See qc driver documentation
# End Time Navigator setup
```

Tape Drive

Example of tape drives detected by Time Navigator.

```
# devdrvconfig -s tape
```

```
Device Type=Tape drive
Device Descriptor=/dev/tape/by-id/scsi-32004000e11802379-nst
Configured=Not available
OS Device Path=/dev/tape/by-id/scsi-32004000e11802379-nst
OS SPT Device Path=/dev/tape/by-id/scsi-32004000e11802379-nst
Vendor Identification=IBM
Product Identification=ULT3580-HH5
Product Revision Level=D2AD
Tape Drive Serial Number=1068017011
Number of Tina drive type for this device=1
Tina type value for this drive=82
==================
Device Type=Tape drive
Device Descriptor=/dev/tape/by-id/scsi-3500104f000b93002-nst
Configured=Not available
OS Device Path=/dev/tape/by-id/scsi-3500104f000b93002-nst
OS SPT Device Path=/dev/tape/by-id/scsi-3500104f000b93002-nst
Vendor Identification=IBM
Product Identification=ULTRIUM-TD4
Product Revision Level=94D7
Tape Drive Serial Number=1310199174
Number of Tina drive type for this device=1
Tina type value for this drive=71
==================
Device Type=Tape drive
Device Descriptor=/dev/tape/by-id/scsi-3500104f000b93005-nst
Configured=Not available
OS Device Path=/dev/tape/by-id/scsi-3500104f000b93005-nst
OS SPT Device Path=/dev/tape/by-id/scsi-3500104f000b93005-nst
Vendor Identification=IBM
Product Identification=ULTRIUM-TD4
Product Revision Level=94D7
Tape Drive Serial Number=1310198365
Number of Tina drive type for this device=1
Tina type value for this drive=71
==================
#
```

CHAPTER 5 - SGI ISSP

This topic is valid only for the SGI ISSP operating system.

> **Note**: Refer to the Time Navigator Compatibility Guide for more information on the supported operating systems.

Useful Commands

- List all probed SCSI tape devices managed by TS (SGI driver):
  `cat /proc/xscsi/ts`
- List all loaded modules:
  `/sbin/lsmod`
  or
  `cat /proc/modules`
- Display last kernel messages:
  `dmesg`

Library Configuration

See Library Driver.

Tape Drive Configuration

No configuration is needed for Tina except that you must use the non rewind special files. For SGI ISSP, the `/dev/ts/tpsXdXnrvc` special files are used. You must use the `/dev/ts/tpsXdXnrvc` in Tina.

If you don't have `/dev/ts/tpsX` special files on your system, first check the content of the `/usr/lib/ts` directory with a "`ls-l`" command. You must have files corresponding to the tape drive you want to use in this directory. For more information, consult the manual page of the `ts` (Tape Support) system (`man ts`).

If you have all the necessary files in the `/usr/lib/ts` directory, you must check the system messages for warning messages about incorrect license files. If you don't have the license, contact your SGI representative.

Time Navigator supports to split drives between `ts` (SGI driver) and `st` (Linux native driver). To configure such a configuration, consult `ts` driver manual.

Example of Devices Detected by Time Navigator on Linux SGI ISSP

```
# devdrvconfig
Version=1.0
====================
```

```
Device Type=Tape drive
Device Descriptor=/dev/tape/by-id/scsi-3500308c388f66000-nst
Configured=Not available
Vendor Identification=HP
Product Identification=Ultrium 4-SCSI
Product Revision Level=V52Z
Tape Drive Serial Number=C388F66000
Number of Tina drive type for this device=1
Tina type value for this drive=72
==================
Device Type=Tape drive
Device Descriptor=/dev/ts/pci0000:08:00.0/fc/500308c388f66004-
500308c388f66005/lun0nrvc
Configured=Not available
Vendor Identification=HP
Product Identification=Ultrium 4-SCSI
Product Revision Level=V52Z
Tape Drive Serial Number=C388F66004
Number of Tina drive type for this device=1
Tina type value for this drive=72
==================
Device Type=Medium changer
Device Descriptor=qc0
Configured=Yes
Vendor Identification=QUANTUM
Product Identification=Scalar i40-i80
Product Revision Level=123G
Library Serial Number=QUANTUMD0H0070008_LLA
Number of slots=25
Number of drives=2
Number of mailbox slots=5
Drives Serialization=Yes
Serial number for drive index0=C388F66000
Serial number for drive index1=C388F66004
Number of Tina library type for this device=1
Tina type value for this library=260
Split=No
==================
#
```

Example of Tape Drives Detected by Time Navigator on Linux SGI ISSP in a st and ts Hybrid Configuration

```
# devdrvconfig -s tape
Device Type=Tape drive
Device Descriptor=/dev/tape/by-id/scsi-3500308c388f66000-nst
Configured=Not available
OS Device Path=/dev/tape/by-id/scsi-3500308c388f66000-nst
OS SPT Device Path=/dev/tape/by-id/scsi-3500308c388f66000-nst
Vendor Identification=HP
Product Identification=Ultrium 4-SCSI
Product Revision Level=V52Z
Tape Drive Serial Number=C388F66000
Number of Tina drive type for this device=1
Tina type value for this drive=72
==================
Device Type=Tape drive
Device Descriptor=/dev/ts/pci0000:08:00.0/fc/500308c388f66004-
500308c388f66005/lun0nrvc
Configured=Not available
OS Device Path=/dev/ts/pci0000:08:00.0/fc/500308c388f66004-
500308c388f66005/lun0nrvc
```

```
OS SPT Device Path=/dev/sg0
Vendor Identification=HP
Product Identification=Ultrium 4-SCSI
Product Revision Level=V52Z
Tape Drive Serial Number=C388F66004
Number of Tina drive type for this device=1
Tina type value for this drive=72
==================
#
```

CHAPTER 6 - SUN Solaris

This topic concerns the SUN Solaris operating systems. System specific information is provided whenever applicable.

> **Note**: Refer to the Time Navigator Compatibility Guide for more information on the supported operating systems.

Library Configuration

The pass-trough qc driver uses a pass-through SCSI interface to send SCSI commands to a device.

What are the Prerequisites for Using the pass-through qc Driver?

The SUN Solaris sgen driver must be configured so that it can recognize a device of library type. Two parameters must be set in /kernel/drv/sgen.conf:

- The device address, e.g., name="sgen" class="scsi" target=3 lun=0;
- device-type-config-list="changer";

Use the `man sgen` command for more information.

Configuring the `sgen` driver creates symbolic links in /dev/scsi/changer directory.

Examples of Symbolic Links

```
c3t3d0 ->
 ../../../devices/pci@0,0/pci1022,7450@a/pci1000,1010@5,1/sgen@3,0:changer).
 [Fibre card]c6t2100001086102D40d0 ->
../../../devices/pci@8,700000/SUNW,qlc@1/fp@0,0/sgen@w2100001086102d40,0:cha
nger
```

How to Manage the pass-through qc Driver Configuration?

The driver is configured through the `devdrvconfig` executable with these options:

- `$TINA_HOME/Bin/devdrvconfig -s mc` Show libraries
- `-c mc` Create configuration file for libraries
- `-d mc` Delete configuration file for libraries
- `-h` Print help

How to Display the List of Connected Libraries?

Enter the `devdrvconfig -s mc` command to display the list of all the libraries that are connected to the system, with their type, name, descriptor, location, and identification.

How to Create a Configuration File for the Libraries?

Enter the `devdrvconfig -c mc` command to create a configuration file. A file of the form /dev/spt_qc0 is created in the /etc/conf_drv directory.

You can edit the configuration file to modify these parameters:

- debug = debug level (0, 1 or 2)
- split = split information in format (0|0-4)(1|5-9)
- emulate = inquiry of the emulated library if the library is unknown to Tina

How to Declare the Library in Tina?

When creating the library in Tina Web Administration, the device descriptor must be `/dev/spt_qc0`. If the library is split, it would be `/dev/spt_qc0s0` for the first split and `/dev/spt_qc0s1` for the second one.

How is the Device Descriptor Re-allocation Managed in a SAN Configuration?

The re-allocation is supported by the pass-through qc driver. The library device descriptor is automatically re-allocated if the system device configuration is modified due to SAN zoning.

If automatic re-allocation fails, the events indicate that a manual reconfiguration is needed. Use these commands to create a new configuration file:

- `devdrvconfig -d mc`
- `devdrvconfig -c mc`

Tape Drive Configuration

The update of the `st` driver is recommended in order to get bug fixes and enhanced performances. However it is not a mandatory step with these versions.

For more information, refer to your SUN Solaris documentation.

Troubleshooting

How to List Devices?

This command enables to check the configuration:

```
# cfgadm -la
 Ap_Id Type Receptacle Occupant Condition
 c0 scsi-bus connected configured unknown
 c0::dsk/c0t2d0 CD-ROM connected configured unknown
 c1 scsi-bus connected configured unknown
 c1::dsk/c1t1d0 disk connected configured unknown
 c2 fc-fabric connected configured unknown
 c2::100000e00221ed86 med-changer connected configured unknown
 c2::200600a0b812d594 disk connected configured unknown
 c2::210000e08b072090 unknown connected unconfigured unknown
 c2::210000e08b07dc32 unknown connected unconfigured unknown
 c2::50060b00002586c0 unknown connected unconfigured failed
```

CHAPTER 7 - HP-UX

This topic concerns the HP-UX operating systems. System specific information is provided whenever applicable.

> **Note**: Refer to the Time Navigator Compatibility Guide for more information on the supported operating systems.

Tape Autoloaders Driver

The driver installation on HP does not require any kernel update.

It is a passthrough driver identified by this device:

`/dev/scsi/(#target)` (when there is only one controller).

Setting up the sctl Driver to Pilot a Library on HP-UX Systems

First, you must verify if the `sctl` driver is the one you must install. To do that, check the tape driver return by the `ioscan -f` command. If it is `stape`, you need to install `sctl`. If it is `tape2`, see Setting up the spt Driver to Pilot a Library on HP-UX Systems below. Then, you must see if the `sctl` driver is installed.

If the `sctl` (SCSI passthru) driver is not linked into your current HP-UX kernel, you must install the driver manually and reboot the system.

If the `sctl` (SCSI passthru) driver is already linked into your current HP-UX kernel, go to step 13.

Follow these steps:

1. Go to the build area: `$ cd /stand/build`
2. Create a system file from your existing kernel: `$ /usr/lbin/sysadm/system_prep -s system`
3. Get information about peripherals attached to your system: `$ ioscan -f`
4. Check if the SCSI passthru driver is already configured into your current kernel: `$ grep sctl system`
5. If no " sctl " line was printed, add a line to the " SCSI drivers " area of the system file (/stand/build/system): `sctl`

> **Note**: A driver statement is needed to override the standard driver automatically configured for any device. One statement is required for each desired NIO SCSI passthru device (be it an SCSI target, or an SCSI lun). Add the driver line(s) to the system file: `driver <path> sctl` where `<path>` is the complete hardware path of the desired device (obtained from the ioscan command: see example below).

6. Create the conf.c and config -s system: `$ /usr/sbin/config -s system`
7. Build a new kernel: `$ make -f config.mk`
8. Save the old system file: `$ mv /stand/system /stand/system.prev`
9. Move the new system file to be the current one: `$ mv ./system /stand/system`
10. Save the old kernel: `$ mv /stand/vmunix /stand/vmunix.prev`
11. Move the new kernel to be the current one: `$ mv ./vmunix_test /stand/vmunix`

12. Boot the system from the new kernel: `$ exec reboot`
13. Once the system reboots, verify the peripheral configuration: `$ ioscan -f`
14. Determine the major number for the SCSI passthru driver. This is now dynamic so it will not always be the same as in the past. The major number is listed under the "Character" field of: `$ lsdev -d sctl`

Character	Block	Driver	Class
137	-1	sctl	sctl

15. Create the special device file to access the scsi_pt peripheral: `$ /usr/sbin/mknod /dev/<devfilename> c <major #> <minor #>`
where:
    - `<devfilename>` = name of the special device file
    - `<major #>` = character major number. See step 14. .
    - `<minor #>` = minor number in the format 0xIITL00 in which:
        - II = 2 digit SCSI card instance number (from the `ioscan` command, `ext_bus` entry)
        - T = Target SCSI ID number (SCSI ID)
        - L = Lun number (SCSI LUN)
        - 00 = Reserved fields, must be zero

Example

Class		H/W Path	Driver	S/W Stat	H/W Type	Description
tape	0	10/4/8.3.0	stape	**SCAN**	DEVICE	HP C1533A
sctl	0	10/4/8.3.1	sctl	**SCAN**	DEVICE	HP C1553A
ext_bus	1	10/4/8	scsi1	**CLAIMED**	INTERFACE	Built-in SCSI

So, an HP 6 cartridge DDS Autoloader (HP C1553) which driver is `10/4/8.3.1 sctl` is connected at SCSI ID 3, and uses SCSI LUN 1.

Even if the display is different in a SAN environment, the two last figures of the H/W Path are the TARGET and the LUN.

To create the device file for an HP 6 Cartridge DDS Autoloader (HP C1553) shown in the ioscan output above, enter:

```
$ /usr/sbin/mknod /dev/C1553_id3_bus1 c 137 0x013100
```

Setting up the spt Driver to Pilot a Library on HP-UX Systems

First, you must verify if the `spt` driver is the one you must install. To do that, check the tape driver return by the `ioscan -f` command. If it is `tape2` you need to install `spt`. If it is `stape`, see Setting

up the sctl Driver to Pilot a Library on HP-UX Systems above. Then, you must see if the `spt` driver is installed. If the spt (SCSI pass thru) driver is not linked into your current HP-UX kernel, you must install the driver manually and reboot the system.

Follow these steps:

1. Go to the build area: `$ cd /stand/build`
2. Create a system file from your existing kernel: `$ /usr/lbin/sysadm/system_prep -s system`
3. Get information about peripherals attached to your system: `$ ioscan -f`
4. Check if the SCSI passthru driver is already configured into your current kernel: `$ grep spt system`
5. If no " spt " line was printed, add a line to the " SCSI drivers " area of the system file (/stand/build/system): `spt`

> **Note**: A driver statement is needed to override the standard driver automatically configured for any device. One statement is required for each desired NIO SCSI passthru device (be it an SCSI target, or an SCSI lun). Add the driver line(s) to the system file: driver <path> spt <path> = complete hardware path of desired device (from ioscan command: see the example below)

6. Create the conf.c and config -s system: `$ /usr/sbin/config -s system`
7. Build a new kernel: `$ make -f config.mk`
8. Save the old system file: `$ mv /stand/system /stand/system.prev`
9. Move the new system file to be the current one: `$ mv ./system /stand/system`
10. Save the old kernel: `$ mv /stand/vmunix /stand/vmunix.prev`
11. Move the new kernel to be the current one: `$ mv ./vmunix_test /stand/vmunix`
12. Boot the system from the new kernel: `$ exec reboot`
13. Once the system reboots, verify the peripheral configuration: `$ ioscan -f`
14. Determine the major number for the SCSI passthru driver. This is now dynamic so it will not always be the same as in the past. The major number is listed under the "Character" field of: `$ lsdev -d spt`

Character	Block	Driver	Class
137	-1	sctl	sctl

15. Create the special device file to acces the scsi_pt peripheral: `$ /usr/sbin/mknod /dev/<devfilename> c <major #> <minor #>`

where:

- `<devfilename>` = name of the special device file
- `<major #>` = character major number. See step .
- `<minor #>` = minor number in the format 0xIITL00 in which:
  - II = 2 digit SCSI card instance number (from the `ioscan` command, `ext_bus` entry)
  - T = Target SCSI ID number (SCSI ID)
  - L = Lun number (SCSI LUN)
  - 00 = Reserved fields, must be zero

Example

Class		H/W Path	Driver	S/W Stat	H/W Type	Description
tape	0	10/4/8.3.0	stape	**SCAN**	DEVICE	HP C1533A
sctl	0	10/4/8.3.1	sctl	**SCAN**	DEVICE	HP C1553A
ext_bus	1	10/4/8	scsi1	**CLAIMED**	INTERFACE	Built-in SCSI

So, an HP 6 cartridge DDS Autoloader (HP C1553) which driver is `10/4/8.3.1 spt` is connected at SCSI ID 3, and uses SCSI LUN 1.

To create the device file for an HP 6 Cartridge DDS Autoloader (HP C1553) shown in the ioscan output above, enter:

```
$ /usr/sbin/mknod /dev/rmt/C1553_id3_bus1 c 137 0x013100
```

For the drive, use `/dev/rmt/c#t#d#BESTnb`.

Example. For a drive plugged on the Controller number 2, with Target number 3 and Lun 0, enter:

```
/dev/rmt/c2t3d0BESTnb
```

CHAPTER 8 - IBM AIX

The topics Library Driver, Tape Drives Configuration, Optical Disk Driver, Frequently Asked Questions, and Troubleshooting concern the IBM AIX operating systems. System specific information is provided whenever applicable.

> **Note**: Refer to the Time Navigator Compatibility Guide for more information on the supported operating systems.

Atempo has designed a useful tool for helping you configure the drivers: `scsiquery`. It can get the unlocked devices inquiries and question the ODM database to get the devices special files. Use `scsiquery -h` to obtain help about this tool. Contact Atempo Technical Support to obtain this tool.

These are the supported HBA:

Constructor	Driver Prefix	Subclass	Type	Scsi Level	Model
Ibm	scsi	scsi	SE, DIFF, LVD	**2**	
Ibm	fcs	fcp	FC	**3**	6227, 6228
Bull	fchan	fcp	FC	**2**	
Emulex	lpfc	scsi	FC	**2**	LP7000, LP8000

Library Driver

Prerequisites

Copying qc Related Files to the Disk

- The driver itself: `#cp qc /etc/drivers`
- The driver texts: `#cp qc.cat /etc/methods`
- The configuration method: `#cp cfgqc /etc/methods`

Creating the Driver Definition in the ODM Database

```
#odmadd qc.add
```

> **Note**: The directory `/etc/methods` must be readable. Use `#chmod 755 /etc/methods`

Installation

Automatically Creating Library Driver Instance

1. Use `cfgmgr` to automatically detect and create the drivers for all present libraries supported by the qc library driver: `#cfgmgr`

> **Note**: `cfgmgr` loads all the drivers for the plugged devices, unless you specify the option: `-l <device parent>`.

2. Check which libraries have been created: `#lsdev -C | grep qc`

```
qc0    Available 04-B0-00-5,0 Time Navigator Library Driver
```

If the cfgmgr binary does not work, use the manual procedure described hereafter:

Manually Creating Library Driver Instance

1. Identify the library controller: `lsdev -Cc adapter`
2. Create a specific library device instance in the ODM database: `mkdev -d -c mediumchanger -t librarydriver -s scsi -p parentX -w Y,Z -a..`
   Example. for Emulex HBA `#mkdev -d -c mediumchanger -t librarydriver -s scsi -p lpfc0 -w 2,4`

   mkdev Options Description Table:

Option	Description
-d	only defines the device
-l	loads device driver in kerrnel and creates device special file
-c `mediumchanger`	medium changer class
-t `librarydriver`	library driver type
-s scsi	scsi subclass
-p parentX	parent = adapter ODM instance and X = adapter number
-w Y,Z	Y = target ; Z = lun(0)
-a <attribute>	see Attributes DescriptionTable

A message indicating the defined driver is displayed: `qcx defined`

3. Load the driver in the kernel and create device special file: `#mkdev -l qcx`

> **Note**: This step must take place every time the machine is started. You may add it in your init scripts.

the qcx status changes from defined to available. A message is displayed: `qcx available`

The driver will attach itself to the library on the first `open`.

4. Check which libraries have been created:
   `#lsdev -C | grep qc`
   `qc0 Available 04-B0-00-5,0 Time Navigator Library Driver`

If you want to modify an attribute of the driver, use this information:

Editing Driver Attribute

1. List the current driver attributes:
   #lsattr -El qc0
2. Edit the listed attributes according to your needs:

- To create a split library:

```
#chdev -l qc0 -a "split=(0|0-5)(1,2|6-17, 20)"
```

See Split Libraries for more information on the split format.

- To modify the driver event logging level:

```
#chdev -l qc0 -a debug=1
```

where the debug value can be 0 to 3:

- 0 CRITICAL_LOG (default)
- 1 WARNING_LOG
- 2 INFO_LOG
- 3 DEBUG_LOG

- To set the template ID for the event logging:

```
#chdev -l qc0 -a error_id=AA8AB241
```

The default template is OPMSG, defined by its template ID. It may be found with

```
# errpt -t -J OPMSG
```

ID	Etiquette	Type	Cl	Description
AA8AB241	OPMSG	TEMP	O	**NOTIFY OPERATOR**

Once you have performed all configuration procedures, list the library device descriptors which are of the format `/dev/qcx,y` (`x` being the number of the instance and `y` the number of the split) with the `ls /dev/qc*` command.

Deleting Library Drivers

1. List all library driver instances

```
#lsdev -C | grep qc
qc0 Available 04-B0-00-5,0 Time Navigator Library Driver
```

2. Delete each library driver instance

```
# rmdev -dl qc0
qc0 deleted
```

3. Delete all driver definition in the ODM database

```
# odmdelete -q 'uniquetype LIKE mediumchanger*librarydriver' -o PdDv
4 objects deleted
# odmdelete -q 'uniquetype LIKE mediumchanger*librarydriver' -o PdAt
611 objects deleted
```

For the previous driver release, also use these commands:

```
# odmdelete -q 'uniquetype LIKE autochanger*quadratec' -o PdAt
# odmdelete -q 'uniquetype LIKE autochanger*quadratec' -o PdDv
# odmdelete -q 'uniquetype LIKE autochanger*tina' -o PdAt
# odmdelete -q 'uniquetype LIKE autochanger*tina' -o PdDv
# odmdelete -q 'uniquetype LIKE autochanger*atempo' -o PdAt
# odmdelete -q 'uniquetype LIKE autochanger*atempo' -o PdDv
```

Updating Library Drivers

1. List the different driver instances:
   `# lsdev -C | grep qc`
   `qc0 Available 04-B0-00-5,0 Time Navigator Library Driver`
   `qcX …`
2. Save the attributes of each instance:
   `# lsattr -El qc0 > qc0_attributes.odm`
   `# lsdev -Cl qc0 >> qc0_attributes.odm`
3. Delete the instances of the QC driver (see above procedures).
4. Install the new driver version (see above procedures).
5. Restore the attributes of each instance:
   Open the file `qc0_attributes.odm`
   Run the command `chdev` for each setting of the `odm` file to restore (see above procedures).

Troubleshooting

Checking that the qc Driver is Loaded

- On AIX 4.3.x, use these commands:

```
# crash
> devsw | grep qc
```

```
open:     0x054ffb68  .[qc:qcopen]
close:    0x054ff738  .[qc:qcclose]
ioctl:    0x054fe060  .[qc:qcioctl]
strategy: 0x054fa784  .[qc:qc strategy]
config:   0x05500740  .[qc:qcconfig]
```

If the addresses are different from 0, the driver is loaded.

- On AIX 5.x, use these commands:

```
# (kdb <<EOF
> lke
> q
> EOF
> ) | grep qc
1 05625980 05590000 0007A960 00000262 /etc/drivers/qc32
```

If the result is empty, the driver was not loaded.

> **Note**: `qc32` means that the kernel is a 32 bits kernel, otherwise it would be `qc64`.

Getting System Logs

Use this command to get system logs about the Atempo library driver:

```
#errpt -a | grep ^qc
qc[0] qcclose: unit 0 not opened
qc[0] qcopen: device not present
qc[0] qc slave: slave operation failed
qc[0] scsi slave: test unit ready command failed
qc[0] extended sense, key=2, ASC=4, ASCQ=3
```

This example results from the fact that the door of the library is open (not ready).

Tape Drives Configuration

1. Set the tape block size attribute to "variable":

   ```
   # chdev -l rmt0 -a block_size=0
   rmt0 changed
   ```

2. If the tape drive uses a `delay` attribute, change the value to 2 or 10 seconds (default is 45) with this command:

   ```
   # chdev -l rmt0 -a delay=10
   rmt0 changed
   ```

   Recommended value for the `delay` attribute:
   - SCSI: 2 seconds.
   - Fiber Channel: 10 seconds.

3. To check that these attributes have been modified, run this command:

   ```
   # lsattr -El rmt0
   ```

- The tape drives device descriptors names are /dev/rmt* (* being the number of the tape drive). You must use the /dev/rmt*.1 device descriptor which describes the no-rewind drivers.
- It is recommended to use the `atape` driver for IBM drives.

Optical Disk Driver

Copying the oc-Related Files to the Disk

- The driver itself:
  `#cp oc /etc/drivers`
- The odm definition:
  `#cp oc.add /etc/objrepos`
- The driver texts:
  `#cp oc.cat /etc/methods`
- The configuration method:
  `#cp cfgoc /etc/methods`

> **Note**: The directory `/etc/methods` must be readable. Use `#chmod 755 /etc/methods`

Installation

1. Use `cfgmgr` to automatically detect and create the drivers for all present devices supported by the oc driver:
   `#cfgmgr`

> **Note**: `cfgmgr` loads all the drivers for the plugged devices.

2. Check which optical drives have been created:
   `#lsdev -C | grep oc`

```
oc0    Available 04-B0-00-5,0 Time Navigator Library Driver
```

If you do not want Tina to manage all the plugged optical drives, you must use this manual configuration procedure:

1. Create the driver definition in the ODM database:

`#odmadd /etc/objrepos/oc.add`

2. Identify device scsi controller:

`lsdev -c | grep scsi`

3. Create a specific optical drive instance in the ODM database:

`#mkdev -d -c optical -t atempo -s scsi -p scsiX -w Y,Z -a <attributes>`
A message indicating the defined driver is displayed:
`ocx defined`

4. Load the driver in the kernel and create the device special file:

`#mkdev -l ocx`
the ocx status changes from defined to available. A message is displayed:
`ocx available`
mkdev Options Description Table:

Option	Description	Type
-d	define	Mandatory
-c optical	optical class	Mandatory
-t atempo	atempo type	Mandatory
-s scsi	scsi subclass	Mandatory
-p scsiX	X = scsi adapter number	Mandatory
-w Y,Z	Y = target ; Z = lun(0)	Mandatory
-a <attributes>	See Attributes list	Optionnal

Attributes list:

Attribute	Description
debug	Level of debug 0 CRITICAL_LOG (default) 1 WARNING_LOG 2 INFO_LOG 3 DEBUG_LOG
error_id	Template id for logging. Use error_id.sh to find it.
emulate	Use to manage unknown inquiry by forcing it

Troubleshooting

Checking that the oc Driver is Loaded

1. Launch the kernel debugger:

```
# crash
```

2. Enter this command:

```
> devsw | grep oc
```

The command's result is displayed:

```
open:           0x054ffb68  .[oc:ocopen]

close:          0x054ff738  .[oc:occlose]

ioctl:          0x054fe060  .[oc:ocioctl]

strategy:       0x054fa784  .[oc:oc strategy]
config:         0x05500740  .[oc:occonfig]
```

If the second column number is different from zero, it means that the oc driver is loaded.

Displaying Installation Process Logs

1. Unload and undefine `oc` driver:

`#rmdev -d -l oc0...ocn` (for each instance of oc you want logs about)

2. Define `oc` driver:

```
##mkdev -d -c optical -t atempo -s scsi -p scsiX -w Y,Z -a <attribute>
```

3. Load driver with logs display (on standard output):

```
#cfgoc -l oc0
```

4. Display system logs:

`#errpt -a -c | grep ^oc` (Running log if error_id attribut is set)

Deleting the oc Driver

1. Unload and undefine the `oc` driver:

`#rmdev -d -l oc0...ocn` (for each instance of oc you want logs about)

2. Remove the `oc` driver from the ODM database:

```
#odmdelete -o PdDv -q ’class = optical’
#odmdelete -o PdAt -q 'uniquetype=optical/scsi/tina'
```

Frequently Asked Questions

How can I be Sure That my Adapter is Compatible with SCSI Protocol (for the Tina Drivers)?

`# scsiquery -d <adapter_prefix> must give a result.`

Or

`# lsconn -p <adapter> -k scsi must give a result.`

How can I Declare an "emulate attribute" with a Value Containing a Blank Space?

First, construct the device without the blank space:

```
#mkdev -d -c mediumchanger -t librarydriver -s scsi -p scsi0 -w 3,0 -a
'emulate=Scalar100'
qc1 Defined
#odmget -q "name=qc1" CuAt > /tmp/EMUL
#more /tmp/EMUL
CuAt:
        name = "qc1"
        attribute = "emulate"
        value = "Scalar100"
        type = "R"
        generic = "DU"
```

```
        rep = "s"
        nls_index = 0
#odmdelete -o CuAt -q "name=qc1 AND attribute=emulate"
0518-307 odmdelete: 1 objects deleted
#vi /tmp/EMUL
```

Modify the "value" line as follows: value = "Scalar 100" and add the /tmp/EMUL file to the odm.

```
#odmadd /tmp/EMUL
```

Troubleshooting

Unable to Load a Tina Driver

A competing driver controls the SCSI device and prevents Tina from loading a drive.

To disable a competing driver

- Either uninstall the driver. This solution is highly recommended. Contact the driver software editor or the IBM Customer Services.
- Or follow the procedure below if you have a good knowledge of the ODM base.

Example. The "smc" driver (IBM driver) controls the "IBM 3583" library.

1. Use the `scsiquery` program to get the driver inquiry. Contact Atempo Customer Services if you do not have this program:
   ```
   # scsiquery
   r0: "IBM     " "ULT3583-TL" controller=scsi2 bus=0 target=0 lun=0
   ```
2. Search for this inquiry in the ODM base:
   ```
   # odmget -q "deflt LIKE *ULT3583-TL*" PdAt
   ```
   All Tina instances "uniquetype" are of the type: `"mediumchanger/xxx/librarydriver"`. Thus, you need to disable any inquiry having a different type of "uniquetype".
3. Disable the instances related to the unwanted driver:
   ```
   #odmget -q "prefix=smc" PdDv
   ```
   This command provides a variety of information including the "uniquetype". Once you have identified the "uniquetype" to delete, run this command:
   ```
   #odmdelete -o PdAt -q "uniquetype=result_of_the_previous_command"
   ```
4. Remove the `smc` instances:
   ```
   #rmdev -dl smc0
   #rmdev -dl smc1
   ....
   ```
5. Run `cfgmgr` again.
6. To verify that the unwanted driver has been removed, perform step 2 again:
   ```
   # odmget -q "deflt LIKE *ULT3583-TL*" PdAt
   PdAt:
           uniquetype = "mediumchanger/scsi/librarydriver"
           attribute = "model_map"
           deflt = "100AULT3583-TL"
           values = ""
           width = ""
   ```

```
        type = "R"
        generic = ""
        rep = "s"
        nls_index = 0
PdAt:
                        uniquetype = "mediumchanger/fcp/librarydriver"
        attribute = "model_map"
        deflt = "100AULT3583-TL"
        values = ""
        width = ""
        type = "R"
        generic = ""
        rep = "s"
        nls_index = 0
PdAt:
        uniquetype = "mediumchanger/fcscsi/librarydriver"
        attribute = "model_map"
        deflt = "100AULT3583-TL"
        values = ""
        width = ""
        type = "R"
        generic = ""
        rep = "s"
        nls_index = 0
PdAt:
        uniquetype = "mediumchanger/fchan/librarydriver"
        attribute = "model_map"
        deflt = "100AULT3583-TL"
        values = ""
        width = ""
        type = "R"
        generic = ""
        rep = "s"
        nls_index = 0
```

All instances "uniquetype" should be of the type:

```
"mediumchanger/xxx/librarydriver"
```

CHAPTER 9 - Library Diagnostic Tool

The topics Running qcdiag in Interactive Mode, Running qcdiag in Batch Mode, and Identifying the Drive Position describe the basic operation of the library diagnostic tool: `qcdiag`.

The qcdiag tool has been created to test the library driver (qc or passthrough) or the library itself, independently of the Tina environment.

You can run this command in interactive mode or in batch mode. The batch mode runs a sequence of commands listed in a text file, which is an easy way to perform automated tests on libraries.

> **Important**: If the library is already used by Tina, you must stop the Tina daemon or service on the server in order to avoid any concurrent access on library and drives.

> **Important**: Moving medias in the library may result in a "silo inconsistency" in Tina if you do not put the medias back in their original location, or launch a library reinitialization after restarting the Tina qcdiag daemon or service.

Running qcdiag in Interactive Mode

The binary is installed in the Bin directory with all the Tina standard binaries.

Unix. Find it at: `$TINA_HOME/Bin/qcdiag`

Windows. Find it at: `%TINA_HOME%\Bin\qcdiag.exe`

Once started, you get the prompt `(qcdiag)`, you can then enter the needed command after the prompt.

First of all, you must open a library before you can diagnose it: use the `open` command on the library "Device Descriptor" (as defined in Web Administration).

Example on Windows. `(qcdiag) open C1B0T6L0.`

Example on Unix. `(qcdiag) open /dev/qc0,0.`

You can then print the status of the library (usually the first command to be run after an `open` command to test the communication with the library):

```
(qcdiag) status
```

The most useful commands to test a library are:

- `geo`: (geometry): returns a table with general information on the library (number of slots, number of drives, adresses of objects ...).
- `init-elt-status`: checks the presence or absence of medias in every library location. May check the barcodes if the library can read them.
- `read-elt-status`: displays the contents of the library (but you need to run a init-elt-status first).

You can also test drives:

- use the "define-tape" and "open-tape" commands on the drive "Device Descriptor"

```
(qcdiag) define-tape d0 /dev/rmt/0cn
(qcdiag) open-tape d0
```

- or move medias
  - from slot to slot: `(qcdiag) move s0 s1`
  - from slot to drive: `(qcdiag) move s1 d0`

Basic qcdiag commands

In order to ...	use the command ...
list all commands	help
get information on a specific command	help <command_name>
quit qcdiag	quit
open a library	open <device_descriptor>
get information on the library (Vendor, Product, FirmWare...)	identity
close the opened library	close

Running qcdiag in Batch Mode

Run qcdiag command with a script filename as parameter.

Example. `# qcdiag move_medium`

Example of "move_medium" script

```
' open library device
open /dev/qc0,0

' open tape device
define-tape d0 /dev/rmt/0cn
open-tape d0

' move medium from slot 0 to drive 0 and back
move s0 d0
move d0 s0
```

Identifying the Drive Position

The drive position is a number that identifies the drive location inside the library. You will need it when declaring the drive in Tina.

> **Note**: The first location in the library corresponds to drive position 0.

The qcdiag tool can help you determine the drive position of a drive in a library.

To identify the drive position through qcdiag

1. Run the qcdiag tool in interactive mode.
2. Associate the SCSI address of each drive with any drive identifier, using the `define-tape` command:
   ```
   define-tape drive_id device_descriptor
   ```
   Where:
   - `drive_id` is the drive identifier: d0, d1, d2, etc.
   - `device_descriptor` is the drive device descriptor in the form of a nSCSI address c?b?t?l? (Controler, Bus, Target, LUN)

   If you have two drives, `do` and `d1`, enter these commands:

   - `define-tape do c1b0t410`
   - `define-tape d1 c1b0t5l0`

3. Enter the `learn` command:
   ```
   learn drive_name drive_name ...
   ```
   Where
   - `drive_id` is the identifier you previously defined the drives with.

   Example. `learn d0 d1`
4. If the result shows that the first drive is associated with drive position 0, the second drive with drive position 1, the third drive with drive position 2 etc., you can easily match the drive positions with the SCSI addresses.

   Example. Result
   ```
   1: d1
   0: d0
   ```
   It means that drive `d0` with SCSI address `c1b0t4l0` is associated with drive position 0, and drive `d1` with SCSI address `c1b0t5l0` is associated with drive position 1.
   If the result shows the drives with mixed up logical indexes, you must re-define the drives, as indicated in step 2, before running the `learn` command again.

   Example. Result
   ```
   1: d0
   0: d1
   ```
   It means that the logical indexes are reversed. Define the SCSI addresses differently and run the `learn` command.
   ```
   define-tape do c1b0t5l0
   define-tape d1 c1b0t4l0
   learn d0 d1
   1: d1
   0: d0
   ```
   Now, `d0` with SCSI address `c1b0t5l0` is associated with drive position 0, and drive `d1` with SCSI address `c1b0t4l0` is associated with drive position 1.