SnapVantage™

(A Linux Server Manager)

Version 1

Installation, Customization, and Usage Guide

Part Number: 313494002

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This edition applies to Version 1 of SnapVantage™ and to all subsequent modifications of that program until otherwise indicated in new editions or revision pages. If there are changes in the program or improvements in the information about the program, this document will be revised and reissued.

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Preface

SnapVantage™ is a software package that allows you to rapidly deploy and manage Linux virtual servers under VM. This book describes how to install SnapVantage and documents the procedures for defining model Linux images, defining applet code to generate image deployment requests, and executing image deployment requests from the SnapVantage GUI.

Who Should Read This Book

This book is for the systems programmers responsible for installing, customizing, and using SnapVantage in a VM operating system environment.

This book presumes that readers are familiar with the information contained in the *V960 Shared Virtual Array Introduction*; *SVAA for VM Configuration and Administration*; and *SVAA for VM Installation, Customization, and Maintenance* manuals. It also presumes readers are familiar with the VM operating system, the conventions that define the local network, and the process to install the desired distribution of Linux.

Terminology

Some terms used in this document are defined as follows:

clone	The newly created Linux image
image	A Linux guest virtual machine running on VM
model	The source Linux image used for the clone process
storage pool	A group of SVA DASD available to a VM directory manager
VM server	The SnapVantage VM server
web server	The Apache server used to enable the SnapVantage web interface

Shared Virtual Array Documentation

This section lists software and hardware documentation for the Shared Virtual Array products.

How to Obtain Software Documentation

All of the Shared Virtual Array software publications are available from the following sources:

- On the "Software Publications" CD-ROM (part number 3134524*nn*). To order a copy, contact StorageTek Publication Sales and Service at 800-436-5554 or send a fax to 303-661-7367.
- Online (for viewing and printing), at the StorageTek Customer Resource Center (CRC) website at: `www.support.storagetek.com`. Click on Software and go to the Shared Virtual Array Software list.

  Note: Access to the CRC site requires a password. To obtain a password, call StorageTek Customer Support at 800-678-4430.

SVA Administrator for VM

The SVA Administrator (SVAA) for VM library consists of:

- *Shared Virtual Array Administrator for VM Configuration and Administration 3134629nn*
- *Shared Virtual Array Administrator for VM Installation, Customization, and Maintenance 3134631nn*
- *Shared Virtual Array Administrator for VM Reporting 3134630nn*
- *Shared Virtual Array Administrator for OS/390 and VM Messages and Codes 3112907nn*

Related SVA Software Publications

For any StorageTek software:

- *Requesting Help from Software Support*

SVA Hardware Publications

Shared Virtual Array hardware publications are available from the following sources:

- On the "SVA Hardware Publications" CD-ROM (part number 3118447*nn*). To order a copy, contact StorageTek Publication Sales and Service at 800-436-5554 or send a fax to 303-661-7367.
- Online (for viewing and printing), at the StorageTek Customer Resource Center (CRC) website at: : `www.support.storagetek.com`. Click on Disk Subsystems.

  Note: Access to the CRC site requires a password. To obtain a password, call StorageTek Customer Support at 800-678-4430.

V960 SVA Publications

The V960 Shared Virtual Array (SVA) library consists of:

- *V960 Shared Virtual Array*
  General Information
  MO5011x
- *V960 Shared Virtual Array*
  Introduction
  MO5006x
- *V960 Shared Virtual Array*
  Operation and Recovery
  MO5007x
- *V960 Shared Virtual Array*
  Planning
  MO5008x
- *V960 Shared Virtual Array*
  Reference
  MO5009x
- *V960 Shared Virtual Array*
  System Assurance
  MO5010x
- *Peer-to-Peer Remote Copy Configuration Guide*
  MP4007x

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Chapter 1. Introduction

This chapter introduces the SnapVantage™ architecture and provides a checklist of the steps necessary to install and customize SnapVantage in the VM and virtual Linux server environments.

SnapVantage Architecture

SnapVantage provides an administrator facility (Web GUI or Command Line Interface) to clone, manage, and deploy Linux system images running under the VM operating system.

The SnapVantage architecture has three primary components:

- **SnapVantage VM Server** – A VM/CMS multitasking service that provides administrative services for the management of Linux Guest images. It performs authentication and services client requests received via TCP/IP socket communication. It facilitates the advanced features of StorageTek's SVA architecture and the Shared Virtual Array Administrator (SVAA) software. It executes in a disconnected service virtual machine environment.
- **SnapVantage GUI** – The web browser's interface to SnapVantage. It is enabled through the integration of imbedded CGI functions and images into the local Web Server application.
- **Local Deployment Application** – The Apache Web Server, local to the user's intranet, that is used to provide the CGI framework for generation of SnapVantage client request packets.

Figure 1-1 presents the SnapVantage architecture.

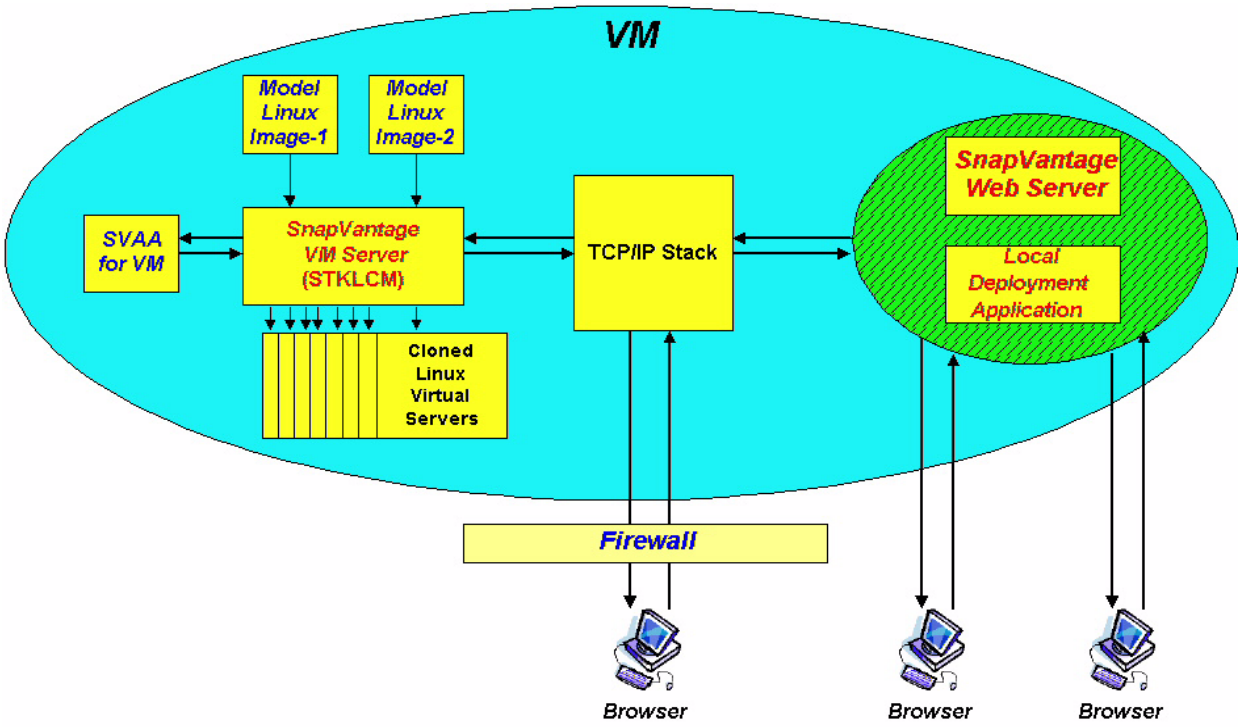


Figure 1-1 SnapVantage Architecture

Installation and Customization Checklist

Step	Description of Action	Required or Optional?	Page	✓
Planning for SnapAdvantage Installation				
1	Verify environmental prerequisites.	Required	6	
2	Determine how SnapVantage will be used.	Required	7	
3	Identify names and IP addresses to be reserved for assignment by SnapVantage.	Required	9	
4	Configure the Model Linux images.	Required	10	
Installing SnapVantage				
5	Identify the SnapVantage local web server.	Required	14	
6	Define the STKLCM virtual machine.	Required	14	
7	Define the Linux server virtual machines.	Required	16	
8	Check security and directory management considerations for the STKLCM VM server.	Required	17	
9	Format the STKLCM minidisks.	Required	18	
10	Install the SnapVantage software.	Required	19	
11	Verify SnapVantage software installation.	Required	20	
12	Copy SnapVantage files to the SnapVantage web server.	Required	22	
13	Copy SnapVantage files to the Model Linux images.	Required	24	
Customizing the SnapVantage Installation				
14	Configure SIBLCM USERIDS file.	Required	28	
15	Configure SIBLCM TCPINFO file.	Required	30	
16	Configure SIBLCM CONFIG file.	Required	32	
17	Configure SIBLCM MODELS file.	Required	37	
18	Configure Model image *name* TEMPLATE files.	Required	38	
19	Define SnapVantage VM server initiation.	Optional	42	
20	Customize optional user exits.	Optional	43	
21	Boot from VM reader.	Optional	44	

Chapter 2. Planning for SnapVantage Installation

Planning for SnapVantage installation consists of the following tasks, which are detailed in this chapter:

Step 1 Verify environment prerequisites.

Step 2 Determine how SnapVantage will be used.

Step 3 Identify names and IP addresses to be reserved for assignment by SnapVantage to newly deployed Linux images.

Step 4 Configure the Model Linux images.

It is recommended that you print and complete the planning worksheets described in Appendixes A through D before you begin the SnapVantage installation.

Step 1: Verify Environment Prerequisites

Before you install SnapVantage, review the following prerequisites to determine the viability of SnapVantage in your VM environment:

Table 2-1 Software Prerequisites

Category	Description	Minimum Level or Version
Operating system software	z/VM or VM/ESA	3.1, CMS 14 2.4, CMS 14
SVA software	SVAA	3.1 with PTF L2P008E
Programming language	Perl	5.005
Web server software	Apache	1.3.12
One of the following Linux distributions:	 SuSE SuSE Red Hat Turbolinux	 7.0, Linux Kernel 2.2.16 7.2, Linux Kernel 2.4 7.2, Linux Kernel 2.4 6.5, Linux Kernel 2.2.19
Web browser	Internet Explorer or Netscape	Only 5.5 or 6.0 Only 4.7

- System hardware and maintenance level that support Linux guests.

  Refer to the current IBM documentation for the latest information on recommended APAR levels and CPU models.

- Linux Web server used by SnapVantage Web Interface

  SnapVantage requires the use of a web server upon which the GUI (html) pages reside. It is recommended that a Guest Linux system with an Apache Web server be dedicated for this purpose.

- SVAA 3.1 for VM -- StorageTek Shared Virtual Array Administrator

  The SnapVantage software is a feature of SVAA for VM and is distributed as a PTF (L2P008E) to SVAA for VM. A StorageTek SVA with the SnapShot feature is required for full functionality of SnapVantage.

- Software Key

  The SnapVantage software requires enablement via a host-based software key. A key request form is available through the StorageTek Customer Resource Center. The URL is: **http://www.support.storagetek.com**

  The required input fields are:

  – Customer Contact Information
  – Site Name
  – Site Location Number
  – CPUID (Issue CP Query CPUID command)
  – Purchase Order Number

Step 2: Determine How SnapVantage Will Be Used

There are several considerations that require resolution prior to implementation of SnapVantage. These considerations include:

Creating disk storage pools for SnapVantage use

It is recommended that disk storage pools be defined for dynamic allocation of disk space for the newly deployed Linux image. SnapVantage supports VMDIRECT, VMSECURE or DIRMAINT disk storage pools. These storage pools should be populated with volumes from the SVA. A unique storage pool should be created for each SVA subsystem to be used by cloned Linux images. Storage pools may also be created to segregate performance-critical volumes within an SVA subsystem.

If no VM directory management system is available, you can run without storage pools. If no storage pools are defined, the Linux image must have each of the minidisks preallocated in the VM directory. There is no need to format them, but they must be the same size and device geometry if they are to be replicated using the SnapShot request.

Creating or defining Model Linux system images which will be made available as a source system for cloning

Determine which types of Model Linux images will be cloned and deployed by the SnapVantage process. You will need to predefine and configure these Model Linux images and identify them during the configuration process.

Creating Linux file systems and LVM groups dynamically during clone operation

If a storage pool exists, you can use SnapVantage to dynamically create and mount a file system of a user-defined size from a user-specified mount point. If the mount point already exists in the model system, it is renamed and the new mount is done during the clone operation. If you specify the same mount point for more than one minidisk, a logical volume group is created using Logical Volume Manager (LVM), provided your Linux distribution supports LVM. This feature requires that additional DASD devices be configured in the Linux kernel.

Examples of Model Linux images are:

- file and print server machine
- web server machine
- minimal test machine
- workstation with office
- temporary server for training purposes
- database server

Model Linux images are created using the standard installation process as defined by the Linux distributor. The Linux administrator will then integrate the SnapVantage agent into the Model Linux images to prepare for cloning. See Step 4.

Creating and defining target Linux system image virtual machines which will be available as target systems for cloning and deployment

A pool of virtual machines, to be assigned for Linux images deployed by SnapVantage, need to be defined to the VM directory. They are defined as recommended by the specific Linux distribution. This policy allows environments preferring en-masse additions of Linux Virtual Machine entities to be made to the VM directory. The advantage of this strategy is that Linux Virtual image nomenclature defined to SnapVantage (SIBLCM USERIDS file) can be reserved in the VM directory so that such an identity cannot be given to another virtual machine resource outside the SnapVantage environment.

Optionally, if a VM directory management exists, you may choose to allow SnapVantage to dynamically add a virtual machine definition to the VM system directory as SnapVantage performs the clone operation. For directory management considerations, see Step 8 (under **User Directory Adds**).

Creating or defining the Apache web server for SnapVantage use.

SnapVantage provides cgi scripts for enablement of the web interface. An Apache web server, usually a VM guest Linux system, should be dedicated for customization and use by SnapVantage.

Creating multiple VM servers on one VM system

SnapVantage supports multiple VM servers on a single VM system. You may want to run multiple servers for security reasons or to separate functions. For example, you could set up a separate VM server to control Linux model development.

Each VM server will contain:

- VM server userid
- SnapVantage port number
- A unique pool of Linux userids and IP addresses

Step 3: Identify Names and IP Addresses to Be Reserved

SnapVantage requires the names and IP addresses assigned to new Linux images it creates to be reserved for server deployment. The required information consists of:

- Host IP address
- Host name (server userid)
- TCP/IP userid
- Peer IP address
- DNS IP address
- TCP/IP device name
- Link type (current support is for VCTC or IUCV)
- Link connection information (based on link type)
  - TCP/IP virtual CTC addresses
  - Linux image Virtual CTC addresses

Appendix B contains a worksheet for gathering userids to be defined to SnapVantage. Appendix C contains a worksheet for gathering IP address information that will be defined to SnapVantage.

Step 4: Configure the Model Linux Images

The SnapVantage software requires that Model Linux images are installed and configured with a Linux distribution before they are used as a source system for the SnapVantage cloning process. There may be several variations of model images defined for future deployment by SnapVantage. Review the following considerations regarding the model system images:

- The Linux distribution must be one that has been certified for use by the SnapVantage configuration scripts. These scripts must be pre-installed and updated upon receipt of any incremental maintenance (refer to Step 13).
- The Linux system "/etc/inittab" file has been copied and modified (refer to Step 13).
- The Linux system has been properly configured with a boot file system which has been shutdown (quiesced) in a normal manner.
- Housekeeping (if desired) may be performed on the Linux system to discard any data that is not necessary for a newly deployed system. This may include removal of files such as: /tmp files, /var/log/messages, /var/log/boot.msg
- The Linux system has been configured with all of the software packages desired for this Model Linux image.
- The Linux system is configured with a valid network configuration to allow the ability to boot to the desired run level, providing the ability to telnet or ftp to it for administration purposes.
- It is recommended, once you have a properly configured model Linux system, that you back it up. The SVAA SnapShot utility SIBVMRVA may be utilized for backup and restores of a quiesced file system.
- The Linux system can be configured for any additional DASD devices (if desired) to be initialized dynamically during the clone operation, such as: swap device, additional file systems (variable sized), and LVM groups. This may include updating the parmfile and running the silo or zipl utility (see the examples below).

Kernel 2.2 Here is an example of generating additional disk to the model system for kernel 2.2:

1. Logon to the Linux model as root.
2. cd to /boot
3. cp parmfile parmfile.new
4. Edit parmfile.new. You will see a line similar to this:

   dasd=C51A,C712,C726 root=/dev/dasdb1 noinitrd

5. You will add the additional virtual device addresses to the end of the existing virtual device addresses. For instance, if you are adding virtual device addresses 0301, 0302, and 0304, the line would look like this:

   dasd=C51A,C712,C726,0301,0302,0304 root=/dev/dasdb1 noinitrd

6. Enter the silo command similar to this:

   silo –f image –d /dev/dasdb –p parmfile.new –b ipleckd.boot

   This assumes that the boot records exist on /dev/dasdb (C712 in this example). Your Linux model may be different.

7. Boot the Linux model.

Kernel 2.4 Here is an example of generating additional disk to the model system for kernel 2.4:

1. Logon to the Linux model as root.
2. cd to /etc
3. Edit zipl.conf. You will see a line similar to this:

   parameters=”dasd=C51A,C712,C726 root=/dev/dasdb1 noinitrd”

4. You will add the additional virtual device addresses to the end of the existing virtual device addresses. For instance, if you are adding virtual device addresses 0301, 0302, and 0304, the line would look like this:

   parameters=”dasd=C51A,C712,C726,0301,0302,0304 root=/dev/dasdb1 noinitrd”

5. Enter the zipl command:

   zipl

   This assumes that the boot records exist on /dev/dasdb (C712 in this example). Your Linux model may be different.

6. Boot the Linux model.

Chapter 3. Installing SnapVantage

Installing SnapVantage consists of the following tasks, which are detailed in this chapter:

Step 5 Identify the SnapVantage local web server.

Step 6 Define the STKLCM virtual machines.

Step 7 Define the Linux server virtual machines.

Step 8 Check directory management considerations for the STKLCM VM server.

Step 9 Format the STKLCM minidisks.

Step 10 Install the SnapVantage software.

Step 11 Verify the SnapVantage software installation.

Step 12 Copy SnapVantage files to the SnapVantage web server.

Step 13 Copy files to the Model Linux images.

Step 5: Identify the SnapVantage Local Web Server

An existing Linux system can be used to host the SnapVantage Web Server provided the following prerequisites are satisfied:

- Apache Web Server
- Perl
- TCP/IP access to the VM system where the STKLCM virtual machine resides

This web server system will be configured to display the SnapVantage web pages. This system should be secured behind a firewall.

Record the IP address or DNS name (i.e., hostname.domain.com) of this system for future use. This information is defined as a trusted client to SnapVantage in Step 16 (page 32) and is used by your web browser.

Step 6: Define the STKLCM Virtual Machine

The SnapVantage VM server, referred to as STKLCM within this document, is a CMS virtual machine that manages the cloning process of Linux images using the advanced features of StorageTek's SVA architecture and the Shared Virtual Array Administrator (SVAA) software. These features provide an instantaneous copy or format utilizing virtual disk architecture. It also provides the ability to clone images using traditional VM utilities such as DDR and CMS Format on non-virtual disk.

STKLCM runs as a disconnected virtual machine and communicates with client software via TCP/IP. This virtual machine should be autologged at VM IPL and remain logged on in a disconnected state.

To define the VM server, an STKLCM directory entry must be added to the VM system directory. Figure 3-1 shows an example of the STKLCM VM directory entry. A virtual machine definition worksheet can be found in Appendix A.

```
USER STKLCM password 32M 32M BCEG
ACCOUNT xxxxxx
MACHINE ESA
IUCV DUALPASS
OPTION DIAG88
IPL CMS PARM AUTOCR
CONSOLE 009 3215 A
SPOOL 00C 2540 READER
SPOOL 00D 2540 PUNCH A
SPOOL 00E 1403 A
LINK MAINT 190 190 RR
LINK MAINT 19D 19D RR
LINK MAINT 19E 19E RR
*
MDISK 191 3390 scyl 30 volser M ALL
MDISK 193 3390 scyl  5 volser RR ALL
*
LINK MAINTSTK 454 194 RR
LINK TCPMAINT 592 195 RR
```

Figure 3-1 STKLCM Virtual Machine Directory Entry

As illustrated above, the virtual machine defined for SnapVantage execution should include:

- Default virtual memory definition of 32 meg
- Classes B, C and E are required for certain CP commands. These privileges may be replaced with a privilege class override.

  To define a new privilege class V use one of the following examples.

  For the System Configuration file (recommended):

```
MODIFY CMD QUERY IBMCLASS B PRIVCLASS BV
MODIFY CMD SET SUBCMD SECUSER IBMCLASS C PRIVCLASS CV
MODIFY CMD INDICATE IBMCLASS E PRIVCLASS EV
```

  For the Override file:

```
QUERY IBMCLASS=B NEWCLASS=BV
SET SECUSER IBMCLASS=C NEWCLASS=CV
INDICATE USER IBMCLASS=E NEWCLASS=EV
```

- MACHINE ESA sets the virtual machine to run in ESA mode.
- For password validation, the following authorizations are required in the VM directory:

```
IUCV DUALPASS
OPTION DIAG88
```

- For VMSECURE configuration, authorization is required for DIAGPCHK:

```
GRANT DIAGPCHK TO STKLCM
```

- RTM command authorization (optional performance monitor product)
- The minimum allocations for STKLCM minidisks are:

Minidisk Virtual Address	Number of 3390 Cylinders
191	30 per 1000 deployed Linux images
193	5

- A link to the MAINTSTK 454 (SVAA) minidisk at a virtual address of 194.
- Certain SVAA commands require additional VM privileges. If you want to execute these commands from the VM server, you may define them here. In the *SVAA for VM Installation, Customization, and Maintenance* guide, refer to the step titled “Define VM Privileges” for details.
- Optionally, a link to TCPIP (usually 592) may be necessary to access some TCP/IP files. The TCP/IP files used by SnapVantage are:

  OBEYFILE MODULE

  TCPIP DATA

Step 7: Define the Linux Server Virtual Machines

The Virtual Machines to be assigned for Linux servers deployed by SnapVantage need to be defined in the VM directory.

The Linux Virtual Servers can be created with any valid VM userid name. For example, a directory entry for a Linux Virtual Server to be named LNXZBOTR is displayed in Figure 3-2.

If you are using a directory management system, we suggest that you create a prototype or skeleton that contains these directory entries. This enables you to dynamically define a new user during the clone operation.

No read/write disks are required in this definition as they are normally acquired by dynamic allocation through a storage pool. If storage pools are not available, you will need to define the Linux minidisks.

```
USER LNXZBOTR password xxxM yyyM G
ACCOUNT xxxxxx
MACHINE ESA
XAUTOLOG STKLCM
IPL CMS PARM AUTOCR
CONSOLE 009 3215 A
SPOOL 00C 2540 READER
SPOOL 00D 2540 PUNCH A
SPOOL 00E 1403 A
LINK MAINT 190 190 RR
LINK MAINT 19D 19D RR
LINK MAINT 19E 19E RR
*
LINK STKLCM 193 191 RR
LINK STKLCM 191 193 RR
LINK MAINTSTK 454 194 RR
```

Figure 3-2 Sample Linux Virtual Server Directory Entry

As illustrated in Figure 3-2, each virtual machine defined for Linux Virtual Servers should include:

- Virtual Machine settings and option values based upon the values recommended by the Linux distribution planned for this userid.

  The memory size for a Linux server is set when the server is cloned. The "xxxM" value represents the default memory size. The "yyyM" value is the maximum memory size allowed for the Linux server. A reasonable set of memory values is **64M 512M**.

- **XAUTOLOG STKLCM** -- unless enabled by a rules-based security system.
- Link R/O to the **STKLCM** minidisks (**191** and **193**).
- Link R/O to the **MAINTSTK 454** (SVAA Run disk) minidisk at a virtual address of **194**.

Step 8: Security and Directory Management for the STKLCM VM Server

VMSECURE or VMDIRECT users:

- **Storage pools:** STKLCM can dynamically allocate minidisk space for SVA storage pools using the ADDMDISK function (user exit SIBLCM99 and configuration options). DELMDISK is then used to dynamically delete minidisks (user exit SIBLCM98).
- **User Directory Adds:** STKLCM can also dynamically add users to the VM directory using the ADDENTRY function. DELENTRY is then used to dynamically delete userids. (User exit SIBLCM96 and configuration options)

VMSECURE users:

- **GROUP rules authorization** is recommended for STKLCM.
  - STKLCM needs to XAUTOLOG the clone userids without being prompted for a password.
    For example: ACCEPT STKLCM XAUTOLOG (NOPASS
  - STKLCM needs to LINK to the dynamically allocated clone minidisks.
    For example: ACCEPT STKLCM LINK (NOPASS

DIRMAINT users:

- **Storage pools:** STKLCM can dynamically allocate minidisk space for SVA storage subpools using the AMDISK function (user exit SIBLCM99 and configuration options). DMDISK is then used to dynamically delete minidisks (user exit SIBLCM98).
- **User Directory Adds:** STKLCM can dynamically add users to the VM directory using the ADD function. PURGE is then used to dynamically delete userids. (User exit SIBLCM96 and configuration options)

RACF users: Refer to RACF documentation for specifics.

Users without a rules-based security system:

- **XAUTOLOG authority:** STKLCM needs to XAUTOLOG the clone userids without being prompted for a password. (CP Directory option)
- **CP LINK authority:** STKLCM needs Read link authority to any of the minidisks owned by the cloned userids without being prompted for a password (MDISK Keyword ALL). In addition, it optionally needs Write link authority for data space release on the SVA disk. (User exit SIBLCM93)

Step 9: Format the STKLCM Minidisks

Log onto the STKLCM userid and format its minidisks. Use the CMS FORMAT command to format these minidisks.

```
LINK * 193 193 M

FORMAT 191 A#1#LCM191

FORMAT 193 B#1#LCM193
```

Step 10: Install the SnapVantage Software

The SnapVantage software is installed on the SVAA maintenance disks on userid MAINTSTK. It is distributed as an SVAA PTF under the base product ID of SSIB310V. Once you have obtained the PTF, follow the supplied instructions or refer to the section on applying maintenance in the *SVAA for VM Installation, Customization, and Maintenance* guide. Once you complete this process, all of the SnapVantage software will reside on the SVAA RUN DISK (linked by STKLCM as 194).

Install the SnapVantage files on STKLCM disks by executing the installation exec LCMINST. Since the key SnapVantage files are distributed as sample files, in SIBSAMP MACLIB, the install exec will extract and copy the necessary files to the SIBLCM minidisks using a standard naming convention. These files are profile exec(s), configuration data, and Linux tar files. In a later step, the tar files will be ftp'd to the target Linux systems from STKLCM 193, then unloaded using the Linux tar command.

Each of the configuration files are provided as a template with a filename of SAMPLE. This allows you to copy and customize them as needed for the desired configuration. Maintenance updates to these files will result in a replacement of the SAMPLE file.

Enter the following command sequence from the STKLCM userid:

```
LINK * 193 193 M

ACCESS 191 A

ACCESS 193 B

ACCESS 194 C

SIBSAMPX LCMINST LCMINST EXEC B

EXEC LCMINST

COPY SAMPLE EXEC A PROFILE EXEC A

COPY SAMPLE EXEC B PROFILE EXEC B

COPY SAMPLE USERIDS A SIBLCM USERIDS A

COPY SAMPLE TCPINFO A SIBLCM TCPINFO A

COPY SAMPLE CONFIG B SIBLCM CONFIG B

COPY SAMPLE MODELS B SIBLCM MODELS B

COPY PROFSIBA SIB C PROFSIBA SIB A
```

To enable SVAA command access, customize PROFSIBA SIB. For instructions, see the step titled "Customizing the Default SVAA Profile" in the *SVA Administrator for VM Installation, Customization, and Maintenance* guide.

Step 11: Verify SnapVantage Software Installation

From the STKLCM userid, enter `SIBLCMIV` to verify the installation process status. The following log will be displayed:

```
siblcmiv
06:31:18 SnapVantage Installation Verification
06:31:18 CP QUERY CPLEVEL
VM/ESA Version 2 Release 4.0, service level 0101
Generated at 07/26/2001 12:49:08 MDT
IPL at 04/21/2002 08:33:59 MDT
06:31:18 CMS QUERY CMSLEVEL
CMS Level 15, Service Level 004
06:31:18 CMS QUERY DISK
LABEL  VDEV M  STAT   CYL TYPE BLKSZ   FILES  BLKS USED-(%) BLKS LEFT  BLK TOTAL
LCM191 191  A   R/W     5 3390 4096       28        107-12        793        900
LCM193 193  C   R/W     2 3390 4096       16         23-06        337        360
IHSRUN 194  E   R/O    60 3380 4096      256       5216-58       3784       9000
MNT190 190  S   R/O   100 3390 4096      705      14651-81       3349      18000
MNT19E 19E  Y/S R/O    10 3390 4096       82       1247-69        553       1800

Directory products: DIRMAINT VMDIRECT VMSECURE

Are you using DIRMAINT for directory management? (Yes|No|Quit)
n

Are you using VMDIRECT for directory management? (Yes|No|Quit)
n

Are you using VMSECURE for directory management? (Yes|No|Quit)
y

Do you want to check VMSECURE add userid? (Yes|No|Quit)
y
06:31:49 A VM userid will be created and then deleted
06:31:49 Enter a userid and skeleton/prototype
06:31:49 For example: TSTUSR99 STKLNXID
tstlnx99 stklnxid
06:32:00 VMSECURE ADDENTRY TSTLNX99 STKLNXID
VMXADD0359I User 'TSTLNX99' assigned to directory manager 'STKLNXCM'.
VMXADD0661I USER entry TSTLNX99 has been successfully created.
06:32:00 VMSECURE return code is 0
06:32:00 VMSECURE DELENTRY TSTLNX99
VMXDEL0425I User 'TSTLNX99', account '050127' has 0 minidisks.
VMXDEL0449I User 'TSTLNX99' removed from directory.
06:32:01 VMSECURE return code is 0

Do you want to check VMSECURE add minidisk? (Yes|No|Quit)
y
06:32:04 A 1 cylinder mdisk will be defined and then deleted
06:32:04 Enter a userid, mdisk, device type and storage pool
06:32:04 For example: STKLNXCM 1FFF 3390 ICEBERGA
STKLNXCM 1FFF 3390 DJPOOL
06:32:16 VMSECURE ADDMDISK STKLNXCM 1FFF DJPOOL 1 3390 * * M ( NOFORMAT )
VMXADD0649I The owning manager of STKLNXCM is MAINT2 and its allocation limits will be referenced.
VMXADD0552I Minidisk STKLNXCM 1FFF was defined and was not formatted.
VMXADD0657I It was allocated from subpool DJPOOL on volume DJD36B, a 3390 device, at location
for 1 cylinder.
VMXADD0658I Its size was calculated using a blocksize of 4096 and will have a link mode of M.
06:32:17 VMSECURE return code is 0
06:32:17 VMSECURE DELMDISK STKLNXCM 1FFF ( NOFORMAT )
VMXQRY0575W Cannot determine minidisk format.
VMXDEL0569I Minidisk STKLNXCM 1FFF was deleted and was not formatted.
VMXDEL0665I It was 1 cylinder located at 1 on volume DJD36B, a 3390 device.
06:32:18 VMSECURE return code is 0
```

```
Do you want to check DNS name resolution? (Yes|No|Quit)
n
Do you want to check TCP/IP command authority? (Yes|No|Quit)
y
06:32:22 NETSTAT LEVEL
VM TCP/IP Netstat Level 320
IBM 2064; VM/ESA Version 2 Release 4.0, service level 0101, VM TCP/IP Level 320; RSU 0101
06:32:24 NETSTAT return code is 0
06:32:24 NETSTAT CP QUERY CPLEVEL
VM TCP/IP Netstat Level 320
CP command output is:
VM/ESA Version 2 Release 4.0, service level 0101
Generated at 07/26/2001 12:49:08 MDT
IPL at 04/21/2002 08:33:59 MDT
CP return code = 0
06:32:24 NETSTAT return code is 0
06:32:24 OBEYFILE SIBLCMIV OBEYFILE A
VM TCP/IP Obeyfile
Requesting TCPIP to accept 'SIBLCMIV OBEYFILE *' on STKLNXCM 191  ...
TCPIP has read and obeyed file 'SIBLCMIV OBEYFILE *'
06:32:25 OBEYFILE return code is 0

Do you want to check VM password authentication? (Yes|No|Quit)
y
06:32:30 Enter a VM userid and password, e.g., STKLNXCM pw
stkdemo1 password
06:32:40 SIBCHKPW STKDEMO1 ********
06:32:40 SIBCHKPW return code is 0

Do you want to check XAUTOLOG capability? (Yes|No|Quit)
y
06:32:43 Enter a userid to be autologged
stklnx05
06:32:51 XAUTOLOG should work without prompting for a password
06:32:52 XAUTOLOG rc=0 AUTO LOGON  ***       STKLNX05 USERS = 46
USER DSC   LOGOFF AS  STKLNX05 USERS = 45

Do you want to check Real Time Monitor access? (Yes|No|Quit)
n

Do you want to check SVAA access? (Yes|No|Quit)
y
06:33:01 SIBADMIN QUERY VERSION
SIB1876I   Shared Virtual Array Administrator 3.1.0.
06:33:02 SIBADMIN return code is 0

Do you want to check Instant Format support? (Yes|No|Quit)
y
06:33:07 A "query only" command will used to check status
06:33:07 Enter a virtual device on an SVA, e.g., 191
191
06:33:17 SIBIFCHK 191
SIBIFCHK:  SVA Instant Format is supported on LUNAR
06:33:17 SIBIFCHK return code is 0
06:33:17 25 Apr 2002 SnapVantage Installation Verification results
06:33:17 < passed  > Product feature installation
06:33:17 < passed  > INDICATE authority
06:33:17 < passed  > VMSECURE add userid
06:33:17 < passed  > VMSECURE add minidisk
06:33:17 < skipped > DNS name resolution
06:33:17 < passed  > TCP/IP command authority
06:33:17 < passed  > VM password authentication
06:33:17 < passed  > XAUTOLOG capability
06:33:17 < passed  > SECUSER authority
06:33:17 < skipped > Real Time Monitor access
06:33:17 < passed  > SVAA access
06:33:17 < passed  > Instant Format support
Ready;
```

Step 12: Copy Files to the SnapVantage Web Server

Use ftp to copy SnapVantage files from the STKLCM 193 minidisk to the SnapVantage Linux Web Server. These files support the SnapVantage graphical user interface (GUI). Enter the following command sequence from a Telnet session:

Command	Explanation
telnet *webserver*	Telnet to the system (webserver) hosting the SnapVantage Web Server
login root	Log into this system as "root"
cd *ScriptAlias*	Change to target directory for cgi scripts in your Apache configuration. The *ScriptAlias* variable is defined in: /etc/httpd/httpd.conf For SuSE distribution the default for *ScriptAlias* is: /usr/local/httpd/cgi-bin For Red Hat distribution the default for *ScriptAlias* is: /var/www/cgi-bin For Turbolinux distribution the default for *ScriptAlias* is: /home/httpd/cgi-bin
ftp *vmhost* or ftp stklcm@*vmhost*	Initiate an ftp session with the SnapVantage VM server, where *vmhost* is the fully qualified name or IP address of the VM system hosting the STKLCM virtual machine. Provide the VM userid and password as necessary.
cd STKLCM.193	Access the STKLCM 193 minidisk
bin	Specify a binary file transfer
get lcmcgi.tar	Copy the lcmcgi.tar file from the STKLCM 193 to the SnapVantage Web Server
quit	Conclude the ftp session
tar –xvpf lcmcgi.tar	Create the "stk" directory, and populate that directory with SnapVantage Web Server files
chown –R root:root stk	Change ownership of these files to: user=root and group=root
chown *user:group* stk/sv/tmp	Change ownership of tmp directory to httpd user:group in your Apache configuration. The *user:group* is defined in http.conf For SuSE distribution the default *user:group* is: wwwrun:nogroup For Red Hat distribution the default *user:group* is: apache:apache For Turbolinux distribution the default *user:group* is: nobody:nobody
mv lcmcgi.tar lcmcgi.tar.*yyyymmdd*	Save a copy of the archive file

cd *DocumentRoot*	Change to target directory for documents in your Apache configuration. The *DocumentRoot* variable is defined in http.conf. For SuSE distribution the default for *DocumentRoot* is: /usr/local/httpd/htdocs For Red Hat distribution the default for *DocumentRoot* is: /var/www/html For Turbolinux distribution the default for *DocumentRoot* is: /home/httpd/html
ftp *vmhost* user stklcm	Initiate an ftp session with the SnapVantage VM server, where *vmhost* is the name of the VM system hosting the STKLCM virtual machine.
cd STKLCM.193	Access the STKLCM 193 minidisk
bin	Specify a binary file transfer
get lcmimg.tar	Copy the lcmimg.tar file from the STKLCM 193 to the SnapVantage Web Server
quit	Conclude the ftp session
tar –xvpf lcmimg.tar	Create the "stk" directory, and populate that directory with SnapVantage Web Server files
chown –R root:root stk	Change ownership of these files to user=root and group=root
mv lcmimg.tar lcmimg.tar.*yyyymmdd*	Save a copy of the archive file

Step 13: Copy Files to the Model Linux Images

You must integrate the SnapVantage agent into each Model Linux image you create so that the image is eligible for use by SnapVantage. This is done by modifying /etc/inittab and installing SnapVantage scripts in /root/stk. Use ftp to copy SnapVantage files from the STKLCM 193 minidisk to the Model Linux images. These files support the customization of the deployed Linux servers.

Execute the following command sequence to perform the installation.

Command	**Explanation**
telnet *modellinuximage*	Telnet to the system (*modellinuximage*) hosting a Model Linux image.
login root	Log into this system as "root" or a root class user.
cd /etc	Change to the /etc directory.
cp inittab inittab.default	Copy the default inittab file.
vi inittab	Edit the inittab file using vi (or another editor). Modify the default runlevel to: **id:1:initdefault**
cd /root	Change to root home directory.
ftp *vmhost* user stklcm	Initiate an ftp session with the SnapVantage VM server, where *vmhost* is the name of the VM system hosting the STKLCM virtual machine. For example: stklcm@vm.stortek.com
cd STKLCM.193	Access the STKLCM 193 minidisk.
bin	Specify a binary file transfer.
get lcmroot.tar	Copy the lcmroot.tar file from the STKLCM 193 to the Model Linux image.
quit	Conclude the ftp session.
tar –xvpf lcmroot.tar	Create the stk directory, and populate it with SnapVantage Model Linux image files.
chown –R root:root stk	Change ownership of these files to "root".
mv lcmroot.tar lcmroot.tar.yyyymmdd	Save a copy of the archive file.
cp .profile .profile.yyyymmdd cp .bashrc .bashrc.yyyymmdd	Save existing files. Ignore errors if the file doesn't exist.
cp stk/.profile .profile cp stk/.profile .bashrc	Copy .profile from the /root/stk directory to the /root directory. The .profile script contains bash commands required for communication between deployed Linux images and the SnapVantage VM server. **Note:** If there are existing .profile or .bashrc files, merge the commands from the stk/.profile into your own files.

cd stk touch *dist*-release	where *dist* is the type of distribution (suse, redhat, turbo) For example: touch turbo-release
shutdown -h now	The Model Linux image is shutdown cleanly before being copied by SnapVantage.

Chapter 4. Customizing the SnapVantage Installation

Customizing the SnapVantage Installation consists of the following tasks, which are detailed in this chapter:

Step 14 Configure the SIBLCM USERIDS file.

Step 15 Configure the SIBLCM TCPINFO file.

Step 16 Configure the SIBLCM CONFIG file.

Step 17 Configure the SIBLCM MODELS file.

Step 18 Configure the Linux image *name* TEMPLATE files.

Step 19 Define SnapVantage VM server initiation.

Step 20 Customize optional user exits.

Step 21 Boot from VM Reader (optional).

Step 14: Configure SIBLCM USERIDS File

Only userid names that are defined to SnapVantage are used in its deployment of virtual servers. The userids are configured by editing the SIBLCM USERIDS files residing on the STKLCM 191 (A) disk. To update this file, logon to the STKLCM userid and access the 191 minidisk as 'A'. Edit the SIBLCM USERIDS file to add userids defined in Step 3 on page 9. Figure 4-1 shows a sample SIBLCM USERIDS file. Refer to the worksheet in Appendix B.

```
*
*  Linux userids
*
*         Matching
*  Userid  Server   Assignment Information
*
U STKLNX01 SUSE_WEB
U STKLNX02 SUSE_WEB
U STKLNX03 REDHAT
U STKLNX04 REDHAT
U STKLNX05 *
```

Figure 4-1 Sample SIBLCM USERIDS File

One new record is created for each userid being defined to SnapVantage. The contents are entered into the record at the column offsets listed in Table 4-1.

Starting Column	Length	Description
1	1	Status: Specify "U" for unassigned. An asterisk in this position indicates a comment.
3	8	Userid: The VM userid name being defined to SnapVantage for assignment to a deployed virtual server image
12	8	Distribution: A name that identifies the Linux distribution image that can use this userid. Simple pattern matching allows a trailing asterisk to match any characters. This name will also be used in the MODELS file (Step 17) and have an associated TEMPLATE file (Step 18).
21	59	Assignment Information: Information created by the VM server only, once a clone operation is completed. It provides status of the clone for management purposes.

Table 4-1 SIBLCM USERIDS Record Format

For example, to enter a new userid called STKLNX01 that can be assigned a Linux image previously defined as SUSE_WEB, the following record would be created:

```
*
*  Linux userids
*
*         Matching
*  Userid  Server   Assignment Information
*
U STKLNX01 SUSE_WEB
```

When the new userid has been cloned, the VM server provides assignment information for management purposes:

```
*
*  Linux userids
*
*         Matching
*  Userid  Server   Assignment Information
*
A STKLNX01 SUSE_WEB 25/Apr/2002 06:49:46 expire 24/Feb/3053 DD=N
```

Step 15: Configure SIBLCM TCPINFO File

SnapVantage assigns previously defined TCP/IP information to virtual servers it deploys. The user is responsible for defining the TCP/IP information to the VM host. SnapVantage currently supports CTC and IUCV communications. Once you have determined the TCP/IP configuration (HOSTNAME, HOST IP, PEER IP, DNS address, and CTC devices) of each of the virtual Linux images, you need to configure SIBLCM TCPINFO.

Only TCP/IP definitions that are defined to SnapVantage will be used in its deployment of virtual servers. This definition is made through an edit process of the SIBLCM TCPINFO file residing on the STKLCM 191 (A) disk. To update this file, logon to the STKLCM userid and access the 191 minidisk as 'A'. Edit the file SIBLCM TCPINFO to add and modify IP addresses and TCP/IP information defined in Step 3 on page 9. Refer to the worksheet in Appendix C.

Figure 4-2 shows a sample SIBLCM TCPINFO file.

```
*
*                    Matching      TCP/IP                                          Link Connection Information
* IP address      Server   Userid   Userid  Peer IP         DNS           Device Name   Type   TCPIP    Server
*
U 129.80.129.157  *        CTLNX02  TCPIP   129.80.123.254  129.80.5.148  CTCCTLX2      VCTC 0F62 0F63 0E60 0E61
U 129.80.129.158  *        CTLNX03  TCPIP   129.80.123.254  129.80.5.148  CTCCTLX3      VCTC 0F64 0F65 0E60 0E61
U 129.80.129.159  *        CTLNX04  TCPIP   129.80.123.254  129.80.5.148  CTCCTLX4      VCTC 0F66 0F67 0E60 0E61
U 129.80.129.160  *        CTLNX05  TCPIP   129.80.123.254  129.80.5.148  CTCCTLX5      VCTC 0F68 0F69 0E60 0E61
U 129.80.128.237  *        TMP01LNX TCPIP   129.80.71.254   129.80.5.148  CTC01TMP      VCTC 0E60 0E61 0E60 0E61
U 129.80.128.239  *        TMP02LNX TCPIP   129.80.71.254   129.80.5.148  CTC02TMP      VCTC 0E62 0E63 0E60 0E61
U 129.80.128.241  *        TMP03LNX TCPIP   129.80.71.254   129.80.5.148  CTC03TMP      VCTC 0E64 0E65 0E60 0E61
U 129.80.128.243  *        TMP04LNX TCPIP   129.80.71.254   129.80.5.148  CTC04TMP      VCTC 0E66 0E67 0E60 0E61
```

Figure 4-2 Sample SIBLCM TCPINFO File

One new record is created for every TCP/IP address being defined to SnapVantage. The contents are entered into the record at the column offsets listed in Table 4-2.

Starting Column	Length	Description
1	1	Status; specify "U" for unassigned. An asterisk in this position indicates a comment.
3	16	IP Address; the IP address defined in Step 3.
19	8	Server Distribution; identifies the Linux distribution image that can use this userid. Simple pattern matching allows a trailing asterisk to match any characters.
28	8	Userid; identifies the deployed Linux virtual servers that can use this IP address. Simple pattern matching allows a trailing asterisk to match any characters.
37	8	TID; the TCP/IP userid (usually TCPIP)
46	16	The peer IP address or gateway IP address
62	16	The IP address of the domain name server
78	16	Device Name; specify "N/A" or the TCP/IP device name. If you specify the device name, STKLCM will attempt to START and STOP the link using the OBEYFILE command.
96	4	The link TCP/IP communication type (VCTC or IUCV)

100	24	Linkinfo; definition information of the Link For VCTC, the first two hex values are the read and write addresses of the virtual CTCs defined to the TCP/IP virtual machine for this linkid. The last two hex values are the write and read addresses of the virtual CTCs defined to the newly deployed virtual server. The virtual server must be deployed to use these CTC addresses.

Table 4-2 SIBLCM TCPINFO Record Format

For example, to enter a new IP address with the following characteristics:

- IP address is 129.80.129.157
- An asterisk (*) indicates that the address can be used to deploy any new virtual server using a model image designated for use with this deployment
- TCP/IP userid is TCPIP
- Peer IP address is 129.80.123.254
- DNS address is 129.80.5.148
- Link type is VCTC
- Connection information includes the read/write addresses of the virtual CTC defined to the TCP/IP virtual machine (0F62 and 0F63), and the write/read addresses of the virtual CTCs defined to the newly deployed virtual server (0E60 and 0E61).

The information would be entered into a new TCPINFO record:

```
*
*                    Matching      TCP/IP                                          Link Connection Information
* IP address      Server   Userid   Userid  Peer IP         DNS           Device Name   Type   TCPIP    Server
*
A 129.80.129.157  *        CTLNX02  TCPIP   129.80.123.254  129.80.5.148  N/A           VCTC 0F62 0F63 0E60 0E61
```

Step 16: Configure SIBLCM CONFIG File

The SnapVantage VM server configuration file, SIBLCM CONFIG C (Figure 4-3 shows a sample), contains the configuration parameters that control the execution of the SnapVantage components. To update this file, logon to the STKLCM userid and access the 193 minidisk as C. See the worksheet in Appendix A.

```
*  Authorized userids permitted to submit requests to this server.
*  Simple pattern matching permits a trailing asterisk (*).
*
-AU(STKLCM MAINT*)

*  IP addresses or fully qualified host names of trusted clients
*  that are authorized to submit requests to this server.
*  Specify "ALL", to allow any client to submit requests.
*
-TC(129.80.128.195 hostname.domain.com
    129.80.70.64)

*  Identify the port to listen for requests. This value needs to
*  match the client to allow for client-server communication.
*
-P(22453)

*  Key used to enable this feature.
*
-KEY(Z5VYRZVTSNGO1I)

*  Feature expiration date (julian yyyyddd).
*
-FED(2002060)

*  Feature customer name.
*
-FCN(StorageTek)

*  Feature site number.
*
-FSN(937213)

*  Feature warning days. Number of days in advance to begin
*  issuing warning messages for an expiring license key.
*
-FWD(45)

*  Userid authentication. If "ON", the userid and password in
*  the LOGIN request is validated against the VM directory.
*
-UA(ON)

*  Directory management software used to dynamically allocate
*  minidisks for virtual Linux servers. Specify "NONE" if
*  dynamic allocation of userids or minidisks is not available.
*  User exits SIBLCM96, SIBLCM98 and SIBLCM99 support the
*  following option values: DIRMAINT VMDIRECT VMSECURE
*
-DM(VMSECURE)

*  Dynamically define userids. This option is provided for user exit
*  SIBLCM96 to support dynamic creation and deletion of VM userids.
*  If "ON", ensure -DDP values are valid for your installation.
*  Valid values: "ON" or "OFF".
*
-DDU(OFF)
```

```
*  Directory default parameters. This option is provided for user
*  exit SIBLCM96 to support dynamic creation of VM userids. Refer
*  to the user exit to see how the -DDP values are used for your
*  directory maintenance product.
*
*  Where: p1  = skeleton or prototype name, e.g., STKLNXID
*         p2  = account number, e.g., 050127
*         p3  = distribution code, e.g., LINUX
*         p4  = ACI group name, e.g., PENGUIN
*
-DDP(STKLNXID N/A N/A N/A N/A N/A N/A N/A N/A N/A)

*  The userid of the virtual machine running the RealTime Monitor.
*  To disable this feature remove the userid. For example, -RTM().
*
-RTM(SMART)

*  Session timeout for inactivity (in minutes).
*
-STO(600)

*  VM userid to receive console logs. This parameter is used
*  to collect all messages from the server and cloned Linux IDs.
*
-SC()

*  Debug mode, ON or OFF. Additional messages are created when
*  ON is specified. This parameter is normally used in combination
*  with the -SC parameter to collect diagnostic information.
*
-D(OFF)

*  Number of days to keep logfiles on the server's 191 A disk.
*  If no logfiles are wanted, specify a value of 0.
*  At the start of a new day, old logfiles will be erased.
*
-LF(10)

*  Autologon Linux userids. Server initialization will autolog
*  the currently defined Linux userids if this value is "ON".
*
-AL(ON)

*  Linux Userids file contains the names of the VM userids
*  to be selected as Linux servers.
*
-UF(SIBLCM USERIDS A)

*  Linux TCP/IP information file.
*
-TF(SIBLCM TCPINFO A)

*  Model distributions file.
*
-DF(SIBLCM MODELS C)

*  Operator messages are sent to this userid (or nickname).
*
-OP(OPERATOR)

*  Disk usage percentage for the A disk. When this value is
*  exceeded, a warning message is sent to the -OP userid.
*
-DUP(75)
```

Figure 4-3 Sample SIBLCM CONFIG File

The following table lists the SnapVantage Configuration parameters, their descriptions, and the possible values that may be assigned to each one.

Note: If the parameter has a default value, that value is underlined (in the Parameter column). A parameter requiring specification upon installation is preceded by an asterisk (*****).

	Parameter	**Description**
	-AL(<u>ON</u> | OFF)	The Autolog parameter is used to determine if Linux virtual servers should be autologged at SnapVantage initialization. Only virtual servers with an autolog priority value of 1 through 3 will be autologged. Example: **-AL(OFF)**
*	**-AU(***userid1 userid2* **)**	Authorized VM Userids - Only users authorized to SnapVantage will have the ability to deploy Linux Virtual Servers.
	-D(<u>OFF</u> | ON)	The Debug parameter is used to create additional messages that reflect diagnostic information. This parameter is an effective tool to diagnose a SnapVantage problem. Due to the high volume of messages, use this parameter only at the direction of StorageTek support personnel. Example: **-D(ON)**
	-DDP(*parms***)**	Directory default parameters to support dynamic creation of VM userids in user exit SIBLCM96. See the user exit to see how the DDP values are used for your directory maintenance product.
	-DDU(ON | OFF)	Dynamically define userids. This option is provided to user exit SIBLCM96 to support dynamic creation and deletion of VM userids.
	-DF(<u>SIBLCM MODELS C</u> | *fn ft fm***)**	The Model Linux Distribution file that is used to identify the source images available to the cloning process. Example: **-DF(SUSE MODELS C)**
	-DM(DIRMAINT | VMDIRECT | VMSECURE | <u>NONE</u>)	Directory management software used to dynamically allocate minidisks for virtual Linux servers. Specify NONE if dynamic allocation of minidisks is not available. User exits SIBLCM96, SIBLCM98, and SIBLCM99 use this value to provide directory management support.
	-DUP(75)	The Disk Usage Percentage for the A disk. When this value is exceeded, a warning message is sent to the -OP userid.

*	**-FCN(***xxxxxx***)**	The Feature Customer Name is a name used to identify this site. This should be the name exactly as provided with the KEY.
*	**-FED(***yyyyddd***)**	The Feature Expiration Date is the julian date that the software KEY will become invalid. This should be the numeric string exactly as provided with the KEY.
*	**-FSN(***nnnnn***)**	The Feature Site Location Number is a number used to identify this site. This should be the numeric string exactly as provided with the KEY.
	-FWD(*nn***)**	Feature warning days. Number of days in advance to begin issuing warning messages for an expiring license key. The default value is 45.
*	**-KEY(***xxxxxx***)**	The Feature Enablement KEY is a character string that is received by request from the StorageTek Customer Resource Center.
	-LF(*nn***)**	The Log File parameter is used to control the number of log files retained on the STKLCM 191(A) minidisk. Each log file contains a day's worth of SnapVantage messages. If no log files are desired, specify "0" The default value is 10. Example: **-LF(14)**
	-OP(<u>OPERATOR</u>| *userid*)	The userid or nickname where operator messages are sent. Example: **-OP(MAINT)**
	-P(*nnnnn***)**	The Port parameter specifies the communications port used for the SnapVantage VM server. The SnapVantage administration application must use this port number to communicate with the SnapVantage VM server. The default value is **22453**. Example: **-P(61384)**
	-RTM(*userid***)**	The userid of the virtual machine running the RealTime Monitor. To disable this feature remove the userid. Example: **-RTM()**
	-SC(*userid***)**	The Spooled Console parameter specifies the VM userid to receive a spooled console output. Due to the large amount of console traffic, it is recommended that this value be set only to diagnose a SnapVantage problem. Example: **-SC(MAINTSTK)**

	-STO(*nnn***)**	The Session Time-Out parameter is used to control when SnapVantage detects a GUI session time-out condition. This value is expressed in minutes. The default value is 600. Example: **-STO(720)**
*	**-TC(ALL** | *ip1 ip2 . . .* **)**	The Trusted Client parameter specifies the IP addresses or DNS names that may request services of the VM server. The IP addresses usually represent Linux virtual servers or VM systems that are running SnapVantage administrative applications. There is no default value for this parameter. If ALL is specified, the VM server will accept requests from all clients. For *ip1 ip2 . . .* , either IP addresses or DNS names can be specified. Example: **-TC(62.137.128.32 hostname.domain.com)**
	-TF(SIBLCM TCPINFO A | *fn ft fm***)**	The TCPIP File parameter is used to identify the SnapVantage TCP/IP Definition file. The file must reside on a R/W CMS minidisk. Example: **-TF(TEST TCPINFO A)**
	-UA(OFF | ON)	Userid authentication. If ON is specified, the userid and password in the LOGIN request is validated against the VM directory. An authorized user must be defined in the VM directory of the system where the SnapVantage virtual server resides. SnapVantage will perform an authentication match against the userid and password credentials as they are defined in the VM directory.
	-UF(SIBLCM USERIDS A | *fn ft fm***)**	The Userid File parameter is used to identify the SnapVantage Userid Definition file. The file must reside on a R/W CMS minidisk. Example: **-UF(TEST USERIDS A)**

Table 4-3 SnapVantage configuration file parameters

Step 17: Configure SIBLCM MODELS File

SnapVantage uses the MODELS file as a GUI input selection screen for Model Linux images. It is also used as a pointer to each individual Linux Model template file. For each Model image defined here a template file will be configured in following steps.

This definition is made by editing the SIBLCM MODELS file residing on the STKLCM 193 (C) disk. To update this file, logon to the STKLCM userid and access the 193 minidisk as C.

Figure 4-4 shows a sample SIBLCM MODELS file.

```
*
* Model Server Distributions
*
*  Server          Web Menu
* Template        Option Name
*
  SUSE        =    SuSE Web Server
  SAMPLE      =    StorageTek Example
```

Figure 4-4 Sample SIBLCM MODELS File

One new record is created for every model Linux distribution being used as a source to SnapVantage.

Server Template -- Represents the configuration file name for each Model image that resides on STKLCM 193 disk. Use the name you defined in the USERIDS file. These template files are to be created in the next step and will use this name as the VM/CMS file name.

Web Menu Option Name -- Used by the GUI to display the source images used by the clone process.

Step 18: Configure Model Image *name* Template Files

For each Linux distribution image identified in the SIBLCM MODELS file, a template file needs to be configured. These definitions are made by editing the *model name* TEMPLATE file(s). To update these files, logon to the STKLCM userid, copy SAMPLE TEMPLATE C (193 disk) to *name* TEMPLATE C for each Model Linux image defined to SnapVantage. Here is an example of a TEMPLATE file for a Linux SuSE distribution.

```
*  Linux distribution name identifies the distribution used to build
*  the model Linux system. The 8 byte value is also used to identify
*  the IMAGE and INITRD files required to boot from the VM reader.
*  Examples: SUSE, SUSE72, REDHAT, REDHAT72
*
-LDN(SUSE)

*  Linux boot device.
*
-LBD(292)

*  Root password. When a Linux server is created, the root password
*  will be changed from the value in -MPW to -RPW. If not specified,
*  the root password will not be changed. If "&RANDOM" is specified,
*  a 7-8 character random password will be generated. The password
*  must be valid for the Linux "passwd" command.
*
-RPW(&RANDOM)

*  Model password for root.
*
-MPW(pw4suse)

*  Model system name. The customization script will change
*  this system name to the userid assigned to the Linux server.
*
-MSN(linuxvm)

*  Model IP address. The customization script will change this
*  value to the IP address selected for the Linux server.
*
-MIP(192.168.218.26)

*  Model peer IP address. The customization script will change
*  this value to the peer IP address selected for the Linux server.
*
-MPIP(192.168.218.23)

*  Model DNS IP address. The customization script will change
*  this value to the DNS IP address selected for the Linux server.
*
-MDNS(192.168.5.148)

*  Linux Expiration Date. A cloned server will expire on this date
*  and all resources (IP address, disk, etc.) will be released.
*
-LED(24/Feb/3053)

*  Linux autologon priority. Server initialization will autolog
*  the currently defined Linux userids based upon their assigned
*  priority 1-3 with 1 being the highest. A value of zero means the
*  Linux userid will NOT be autologged at server initialization.
*
-LAP(2)
```

```
*  Linux virtual storage in megabytes. If "DEFAULT" is specified,
*  the minimum storage size in the Linux userid's directory entry
*  is used. The clone operation will fail if the value specified
*  exceeds the maximum size in the Linux userid's directory entry.
*  If "DEFAULT" is not specified, the value must be > 0 and < 2048.
*
-LVS(DEFAULT)

*  Linux device definitions.
*
*  Action codes: S - SnapShot
*                I - Instant Format
*                T - TDISK (dynamically defined)
*                V - VDISK (dynamically defined)
*                D - DDR
*                F - Format (CMS Format using SIBFMTSS)
*                U - User defined (no action taken)
*
*            Model        Storage           Linux Server
* Action Userid    Vdev     Pool     Mdisk   Size    Type   Description
-LDD(
    S : LNXMODEL : 1201 : ICEBERGB :  292 :        :      : boot    ;
    V :          :      :          :  293 : 250000 :      : swap    ;
    I :          :      : ICEBERGB :  295 :    500 : 3390 : /home   ;
)
```

Figure 4-5 Sample TEMPLATE file

Table 4-4 contains a description of each of the parameters.

Parameter	Description
--LDN(*name***)**	Linux distribution name identifies the distribution used to build the model Linux system. The 8-byte value is also used to identify the IMAGE and INITRD files required to boot from the VM reader. Examples: SUSE, SUSE72, REDHAT
-LBD(*vaddr***)**	Linux boot device minidisk virtual address
-RPW(*password***)**	Root password. When a Linux server is created, the root password is changed from the value in -MPW to -RPW. If not specified, the root password is not changed. If &RANDOM is specified, a 7-8 character random password is generated. The password must be valid for the Linux "passwd" command.
-MPW(*password***)**	Model password for root.
-MSN(*system_name***)**	Model system name. The customization script changes this system name to the userid assigned to the Linux server.
-MIP(*nnn.nnn.nnn.nnn***)**	Model IP address. The customization script changes this value to the IP address selected for the Linux server.
-MPIP(*nnn.nnn.nnn.nnn***)**	Model peer IP address. The customization script changes this value to the peer IP address selected for the Linux server.
-MDNS(*nnn.nnn.nnn.nnn***)**	Model DNS IP address. The customization script changes this value to the DNS IP address selected for the Linux server.
-LED(*dd/month/yyyy***)**	Linux Expiration Date. A cloned server will expire on this date and all resources (IP address, disk, etc.) will be released.
-LAP(*priority***)**	Linux autologon priority. Server initialization will autolog the currently defined Linux userids based upon their assigned priority (1-3 -- with 1 the highest). A value of zero means the Linux userid will NOT be autologged at server initialization.
-LSV(*memory*)	Linux virtual storage in megabytes. If DEFAULT is specified, the default storage size in the Linux userid's directory entry is used. The clone operation fails if the value specified exceeds the maximum size in the Linux userid's directory entry. If DEFAULT is not specified, the value must be > 0 and < 2048.
-LDD(*device descriptors***)**	See device descriptors in following table.

Table 4-4 Template file parameters

Device Descriptor	Description
Action Code	Describes the requested action: S SnapShot I Instant Format T Tdisk (dynamically defined) V Vdisk (dynamically defined) D DDR F Format (CMS Format using SIBFMTSS) U User defined (no action taken)
Model Userid	Describes the source Model VM userid
Model Vdev	Describes the source virtual device
Storage Pool	Describes the pool name for dynamic allocation of target device (if pooling is in effect)
Target Mdisk	Describes the mdisk for the newly cloned image
Target Size	Describes the mdisk size for the newly cloned image
Target Type	Describes the mdisk type for the newly cloned image (3380 or 3390)
Description	Used to describe a Linux file system mount point. If it begins with any character other than "/", it is a comment field only. If it begins with "/", it is a directive to create a mount point on a new minidisk using action code = I (Instant Format). The directive may include one of the following options: -c Copy directories and files to the new mount point. -lv Create a logical volume (only valid for SuSE) -rs Remove the old directory and files. -t Display files being copied to the new mount point. -v Display additional diagnostic messages. Examples: swap = comment only /home -c = create new minidisk, mount point =/home, copy existing /home to new mount point. /database = create new minidisk with new mount point. Note: The newly created minidisk must have an associated DASD device configured in the Linux kernel (Model).

Table 4-5 Device descriptors

Step 19: Define SnapVantage VM Server Initiation

The STKLCM virtual machine is normally executing as a disconnected service machine to support SnapVantage function. **It is suggested that the STKLCM virtual machine be autologged as part of the VM systems' IPL process.**

At the conclusion of this installation and customization process, the STKLCM virtual machine may be placed in a disconnected service machine status by either:

- AUTOLOGging the STKLCM virtual machine, or
- From the STKLCM virtual machine, enter **`#CP DISC`** to disconnect from the new active service machine.

Step 20: Customize User Exits (Optional)

In addition to the SnapVantage configuration files, you can control the VM server with optional user exits. The user exits are written in REXX. To make changes, copy the user exit SIBLCM*xx* EXEC file from STKLCM 194 disk (SVAA Run disk) to STKLCM 193 disk and update the file.

In general, the user exits are used to either permit an operation (rc=0) or reject an operation (rc=nonzero). A rejection return code may also include an optional message. This message usually includes the reason that the operation is being rejected.

The following user exits are provided:

SIBLCM78 Linux server TCP/IP connection

SIBLCM79 Linux server minidisk initialization

SIBLCM93 Link to a userid's minidisk

SIBLCM94 Analyze Linux server messages

SIBLCM95 IP address selection

SIBLCM96 Linux server ID selection.

SIBLCM97 Client request. Command requests are passed through this exit before being processed.

SIBLCM98 Delete server minidisks.

SIBLCM99 Add server minidisk. After the VM Linux userid and IP address have been selected, this exit is called to dynamically ADD a minidisk.

Step 21: Boot from VM Reader (Optional)

In some situations it is very useful to boot the Linux server clones from a VM reader bootable image. For example, if a Linux file system becomes corrupted, one can boot a Linux image from the VM reader, mount the corrupted partition, and correct the file system error.

SnapVantage allows for a VM reader boot, but it is the user's responsibility to make the Linux boot files accessible to the SIBLCMBL program. The boot files are available with your Linux distribution. Copy the boot files to a minidisk that is accessible to your cloned Linux servers. It is recommended that you use the STKLCM 193 minidisk to hold the Linux VM reader boot files.

Note: Due to the size of the boot files, the STKLCM 193 minidisk should be increased in size. LISTFILE the Linux boot files and notice the number of 4K blocks the files require. Ensure that the STKLCM 193 minidisk has that number of free disk blocks.

- Locate the Linux VM reader boot files and note their size in 4K blocks.
- Increase the STKLCM 193 minidisk size to hold the boot files.
- Copy the boot files to STKLCM's 193 minidisk. The filename of the Linux boot files should match the -LDN parameter described in Step 18 (page 38).

  The filetype for the image file is IMAGE.
  The filetype for the reader file is INITRD.
- Test it. Clone a Linux server and shut it down. Log on to the VM userid and type SIBLCMBL. Follow the prompts.

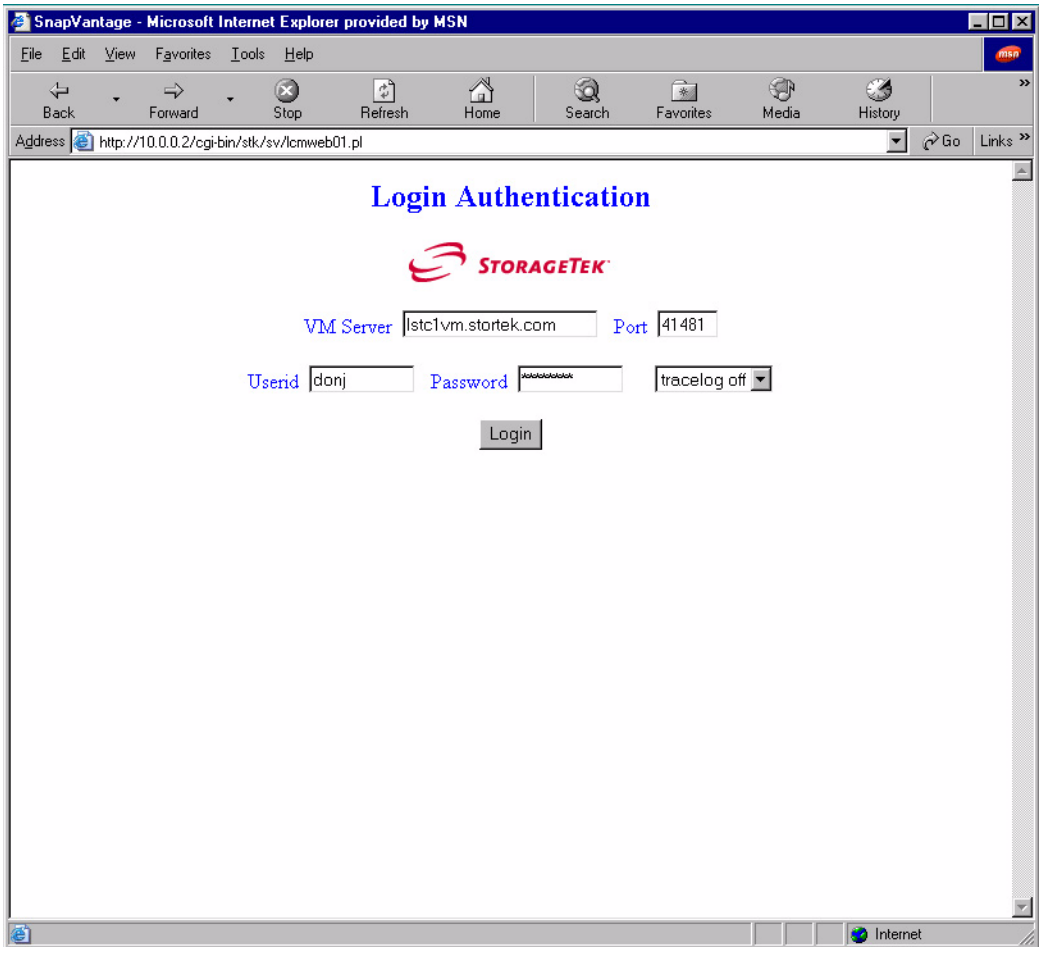
Chapter 5. Using the SnapVantage Web Interface

With the SnapVantage web interface, you can perform the following tasks, which are described in this chapter:

- Access SnapVantage via a Web browser.
- Define and deploy a new virtual server.
- Modify a previously deployed virtual server.
- Delete a previously deployed virtual server.
- Perform VM server administration functions.
- Download SnapVantage files for problem resolution.
- Display SVA configuration information.
- Monitor VM performance.

Accessing SnapVantage via Web Browser

The SnapVantage software is accessed through a standard web browser. Enter and bookmark the URL of the SnapVantage Web Server (i.e. **http://mysystem.mydomain.com/cgi--bin/stk/sv/lcmweb01.pl**), and the **Login Authentication** web page will be displayed.

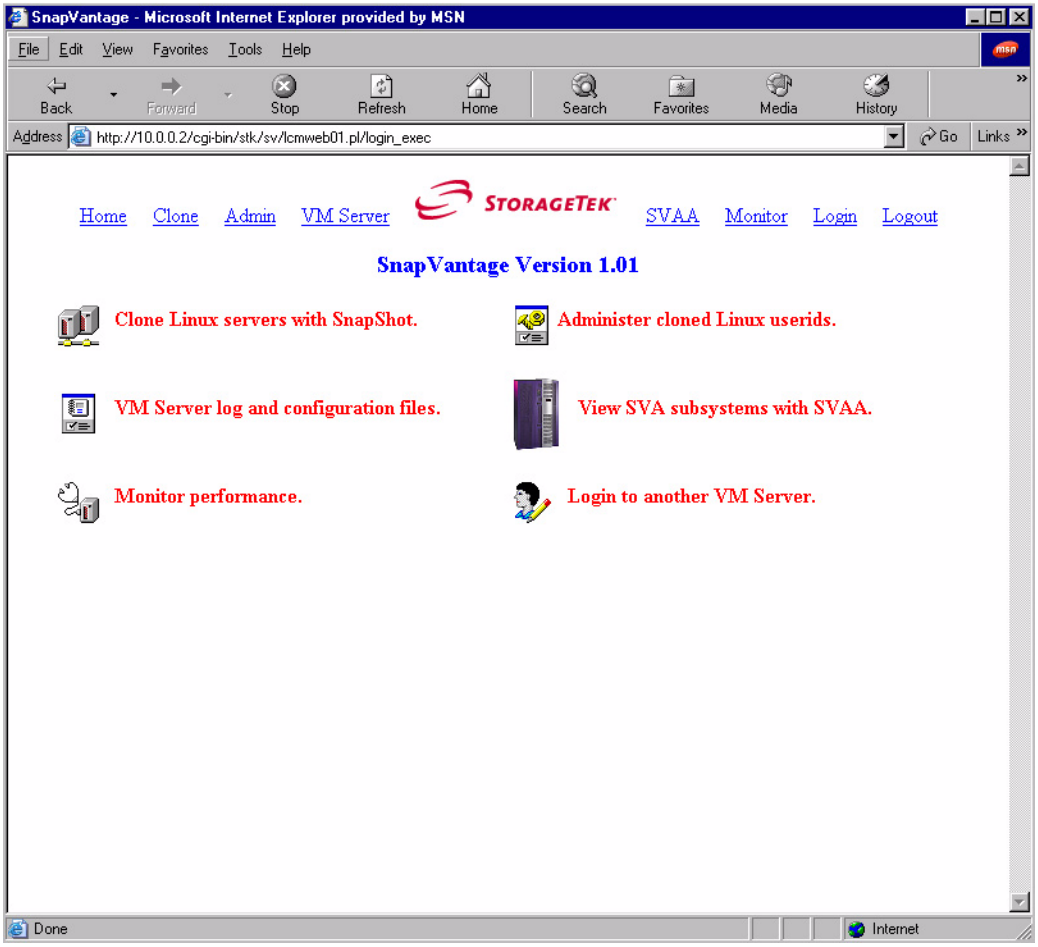


On the **Login Authentication** screen, you must supply login credentials that identify the target VM system where the SnapVantage VM server resides. Use an IP address or DNS name for the **VM Server** field. The **Port** number should match the value specified in the SIBLCM CONFIG file. The **Userid** and **Password** are validated on the system that hosts the VM server.

Note: The SIBLCM CONFIG file has security parameters that restrict access to the VM server. Refer to Step 16 on page 32 for more information on the –TC, -AU and –UA parameters.

The **tracelog** drop-down menu is used to initiate a client trace of the web application. This facility should be used only when requested by StorageTek customer support.

Once you enter proper credentials and they are accepted by the SnapVantage VM server, the SnapVantage **Home Page** is displayed:

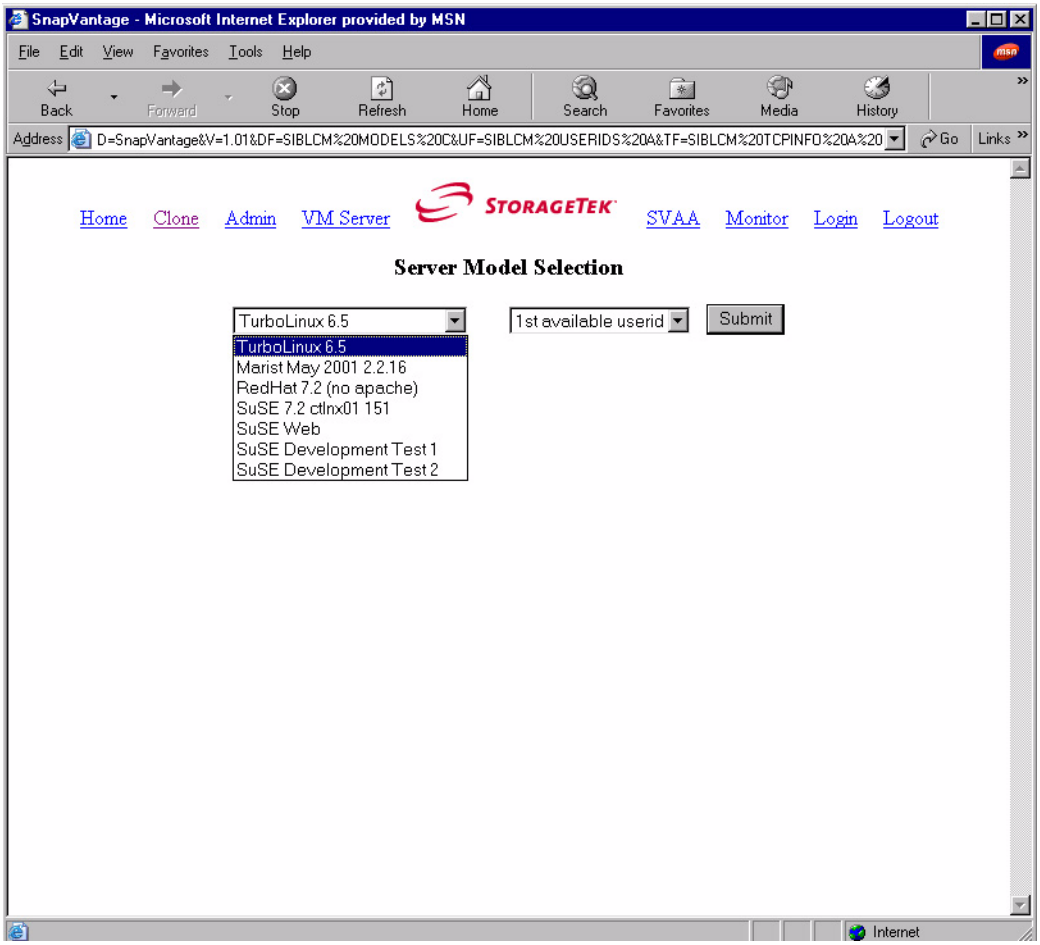


At the top of this page, as well as the pages that follow, is the **SnapVantage banner**. It displays the StorageTek logo and links to other SnapVantage pages.

On the **Home Page** you have several options. You can:

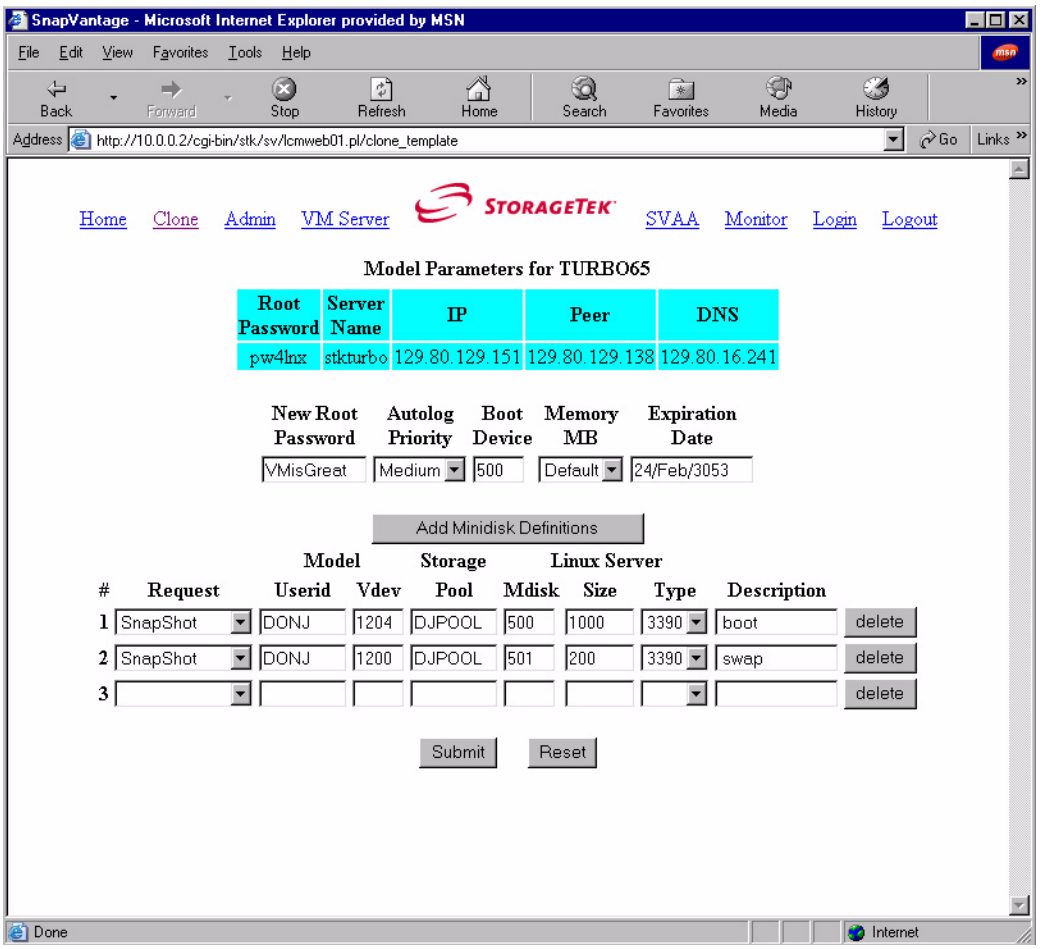
- Clone Linux servers with SnapShot
- View VM Server log and configuration files
- Monitor performance
- Administer cloned Linux userids
- View SVA subsystems via SVAA
- Login to another VM userid or server

Select **Clone** from either the SnapVantage banner or the SnapVantage Home Page, and the SnapVantage **Server Model Selection** page is displayed:



You now have the option to select the Model Linux image to be cloned by clicking on the drop-down menu. The Server Models that appear in this list are defined in the SIBLCM MODELS file. Select the Server Model to be used in this virtual server deployment. The second drop-down list lets you select a specific Linux userid or the "1st available userid" based on criteria specified in the SIBLCM USERIDS file.

The SnapVantage **Model Parameters** page is displayed:



The information displayed in the **Model Parameters** (shaded) area reflects definition parameters for the Server Model specified in the TURBO65 TEMPLATE file. Below this area are definitions that apply to the about-to-be-deployed virtual server. Minidisks that are dynamically defined or require some initialization are listed. In the example above, the boot device is minidisk 500 and the swap minidisk is 501. The minidisks are dynamically defined from the DJPOOL Storage Pool and are initialized by snapping DONJ 1204 and 1200 minidisks to the Linux Server's 500 and 501 minidisks respectively. Modifications or additions to these minidisk allocations can be performed by clicking **Add Minidisk Definitions**. If no empty line is available, one will be created.

Once the desired parameters are specified, click **Submit**.

SnapVantage Model Parameters:

The purpose of this screen is to submit a Clone request to the VM server. It is used to provide the necessary parameters, including source and target disk information, to the Clone process.

Model Parameters: Source parameters as pre-defined in the model template file

New Server Parameters: Target parameters for this clone operation

Root Password: New root password for the target Linux system (optional). The password should follow Linux password guidelines for length and content.

Autolog Priority: Linear priority scheme used by the VM server to boot (autolog) Linux images during initialization and/or Linux Server Administration:

Never (0)
High (1)
Medium (2)
Low (3)

Boot Device: Virtual device address used to boot the target Linux image

Memory MB: This pull-down list allows selection of a virtual storage size in megabytes to be used when booting the Linux server. This value must be valid for the VM userid definition assigned to the Linux server. The **Default** value represents the minimum storage size specified in the VM directory for the Linux server userid

Expiration Date: Date the cloned image is to be deleted by the VM server (all resources released)

Model Request: Minidisk Definitions

Each line of data represents a file system and/or swap file to be cloned from a model system to a target system. The default data displayed is pre-defined in the model template file.

SnapShot: Instantaneous copy of the source minidisk to the target minidisk. These minidisk's must reside on the same SVA subsystem.

Instant Format: Instantaneous format of target minidisk. These minidisks must reside on an SVA that is Instant Format capable.

Note: SIBIFCHK utility may be used to determine capability.

Tdisk: These target devices will be defined using CP DEFINE T-devtype This space must be pre-defined by the VM System Administrator and uses CMS Format (see CMS Format below).

Vdisk: These target devices will be defined using CP DEFINE VFB-512. This space must be pre-defined by the VM System Administrator. CMS Format is used to initialize the Vdisk (see CMS Format below).

DDR: VM utility to copy all extents of the minidisk to the target minidisk

Warning: This command is very I/O intensive and may run for an extended period of time. It is highly recommended that the snapshot option be used for performance reasons.

CMS Format: CMS Format of target minidisk. After the format completes, a CMS RESERVE command is used to allocate space for the entire minidisk.

User Defined: Minidisk definitions that may be used to implement a user-defined data management process.

Userid/VDEV: Specify the model VM userid and virtual device to be used as a source of the clone operation.

Required - copy requests

Optional - format requests

N/A - Tdisk or Vdisk

Storage Pool: Specify the pool name associated with the SVA disk pool

Required - copy or format using VMSECURE or DIRMAINT pooling

Optional - copy or format using pre-allocated minidisk definitions

N/A - Tdisk or Vdisk

Minidisk/Size/Type: Specify the disk information associated with the target Linux image

Minidisk - four digit virtual address

Size - Specify cylinders for 3380/3390 eckd devices, or blocks for FB devices (Vdisk or Tdisk only).

Type - 3390 or 3390 (N/A for Vdisk).

Description: Specify the file system mount point description and parameters.

Required - format requests

By entering a mount point and a device to be Instant Formatted (first character must be a "/") SnapVantage will automatically make a file system and mount it on the newly cloned image. By entering duplicate mount points SnapVantage will assume that this is a Logical Volume and create a LVM group using the specified devices (if your Linux distribution supports LVM).

Optional - for copy requests this is a comment field

Mount point initialization parameters

-c Copy directories and files to the new mount point.

-lv Create a logical volume. (For SuSE only)

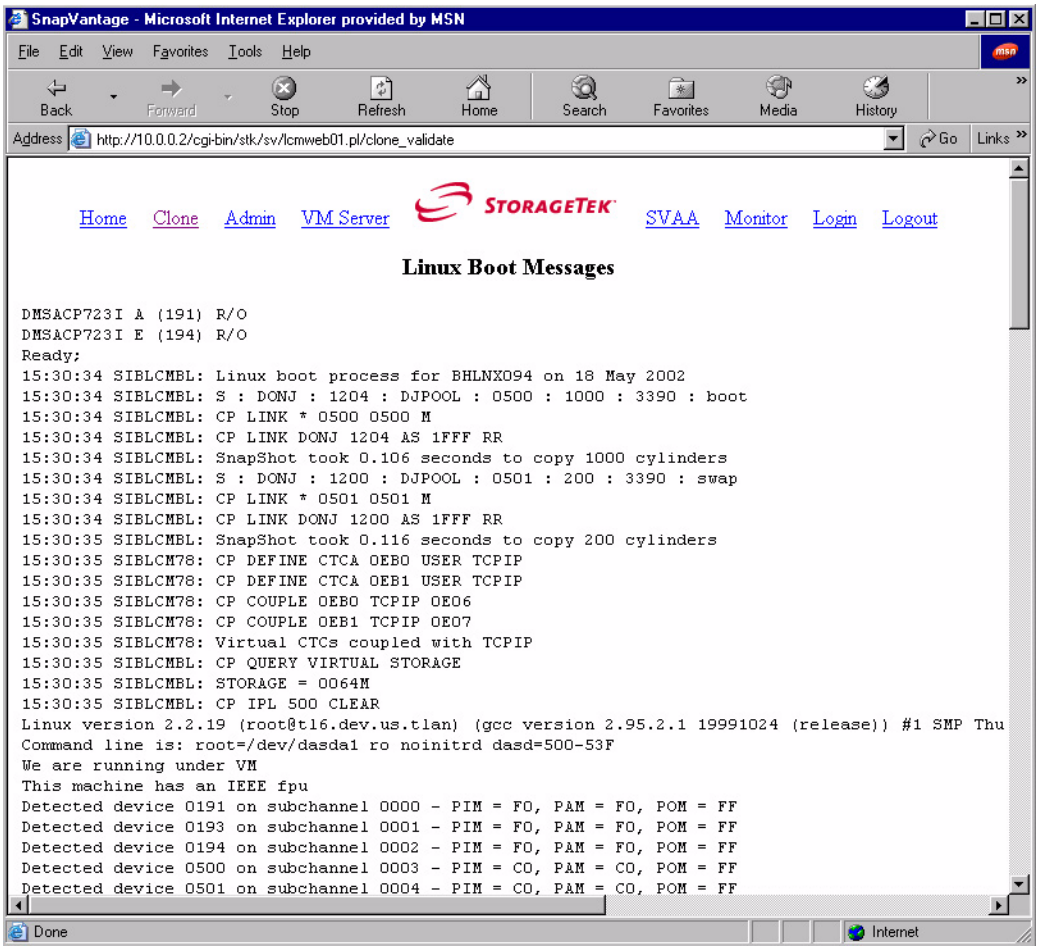
-rs Remove the old directory and files.

-t Display files being copied to the new mount point.

-v Display additional diagnostic messages.

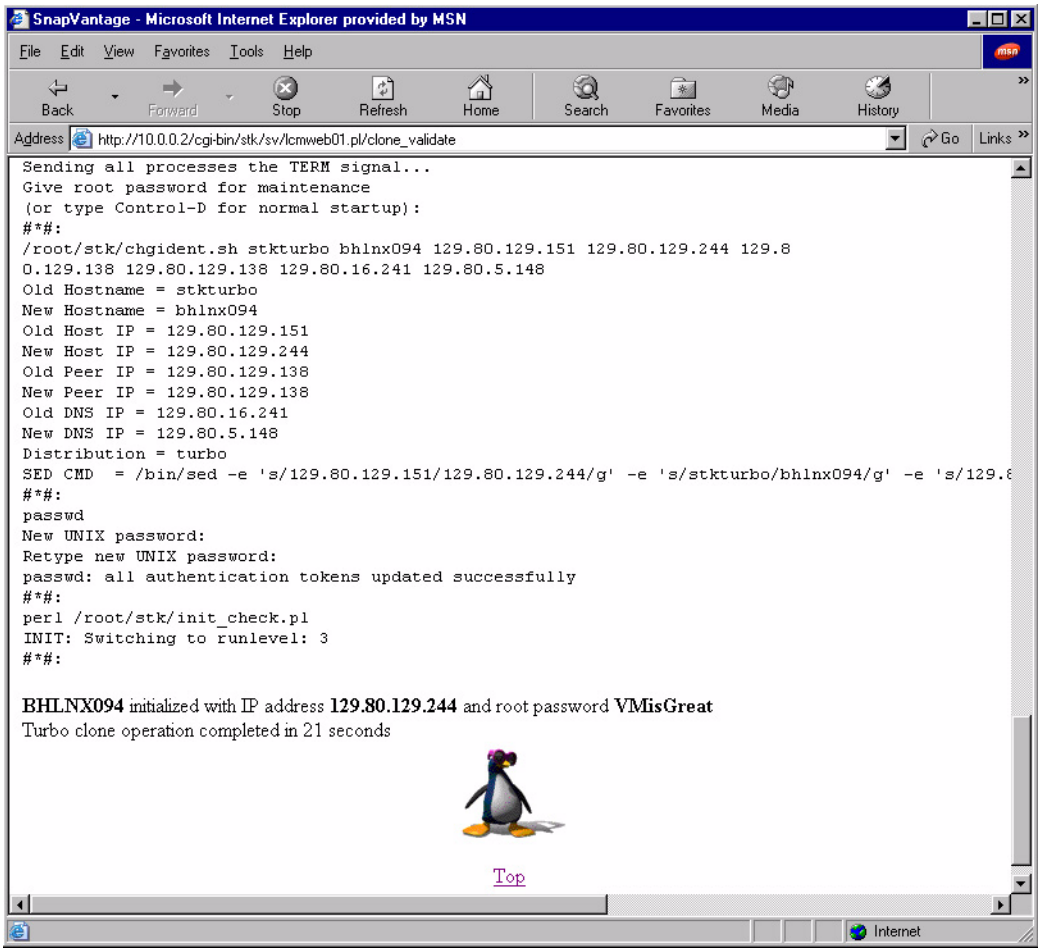
If the mount point exists as a directory in the model, SnapVantage will rename the existing directory and then create the mount point. Use the -c option to copy files from the existing directory to the newly created mount point.

The SnapVantage **Linux Boot Messages** page is displayed:



This sequence of Linux console messages reflects the status of the initial boot process of the newly cloned Linux virtual server. The process to complete the boot may take over 60 seconds.

The completion of the definition and deployment of this cloned Linux image is noted with the following messages:



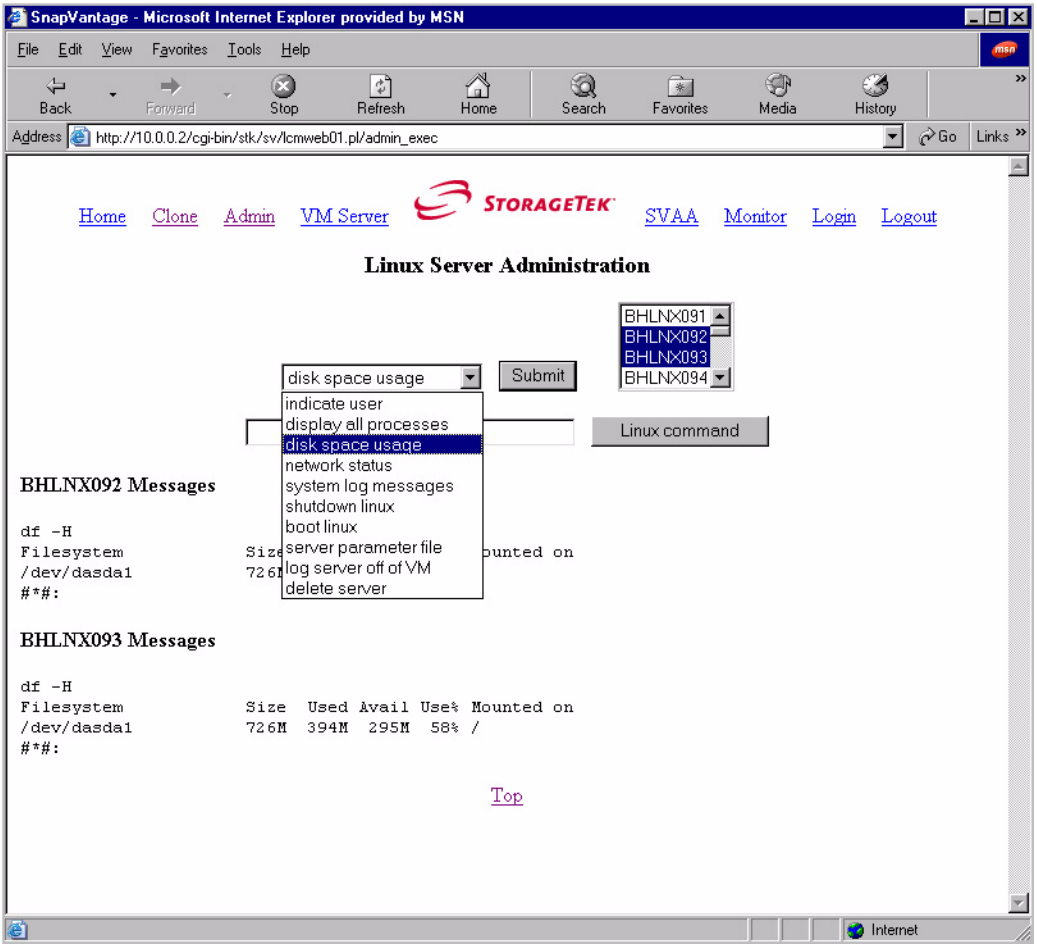
In the above example, a newly defined and deployed Linux Server has been created with the following definitions:

- VM userid name of **BHLNX094**
- IP Address of **129.80.129.244**
- Initial root password of **VMisGreat**

At this time, the newly created Linux virtual server is ready for local customization.

Deleting a Previously Deployed Virtual Server

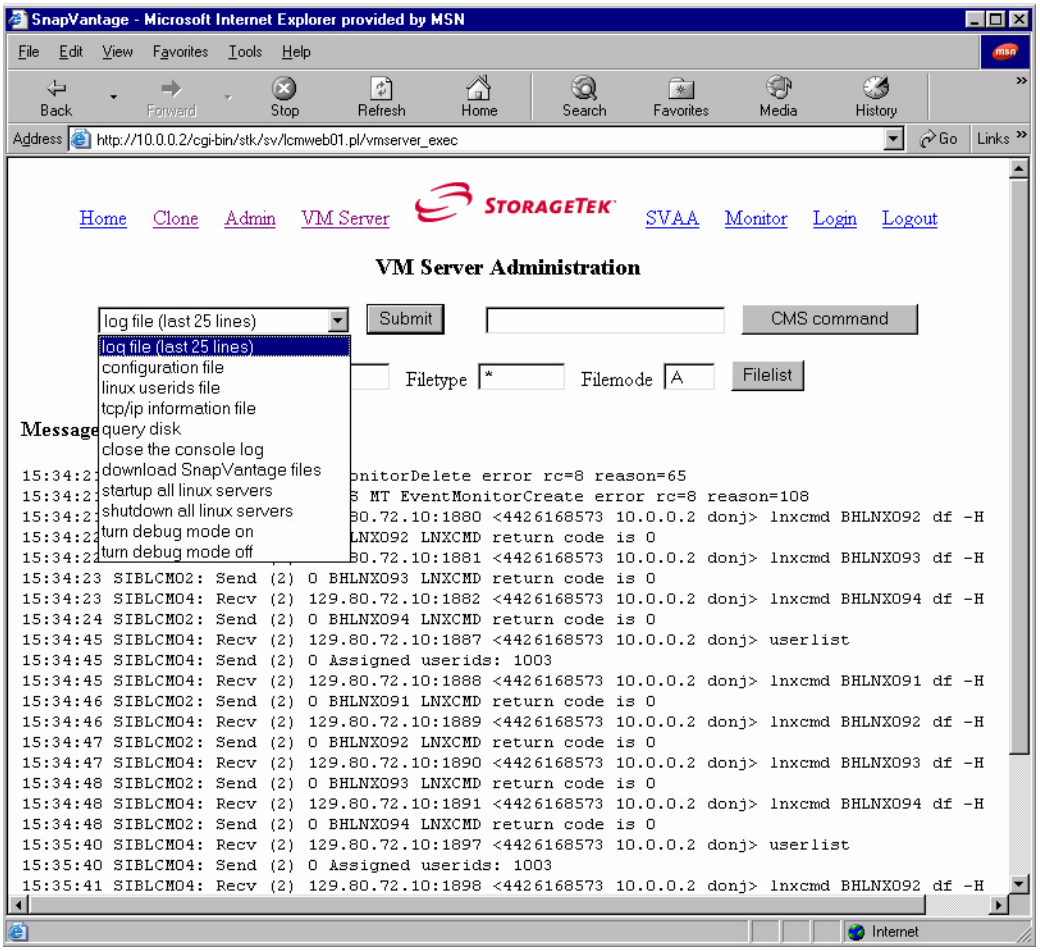
Select **Admin** from either the SnapVantage banner or the SnapVantage Home Page, and the SnapVantage **Linux Server Administrator** page is displayed:



From the Userid drop-down menu, display the list of deployed Linux Servers and select the userid to be deleted. From the Action drop-down menu, select **delete server**. Click the **Submit** button, and the targeted Linux Server will be deactivated and the resources associated with this userid will be deleted from the system. The only deployed Linux Servers you can delete are those that are not active (i.e., not logged on). To logoff a Linux Server that is targeted for deletion, use the **log server off of VM** action from the **Action** drop-down menu, before specifying the **delete server** action.

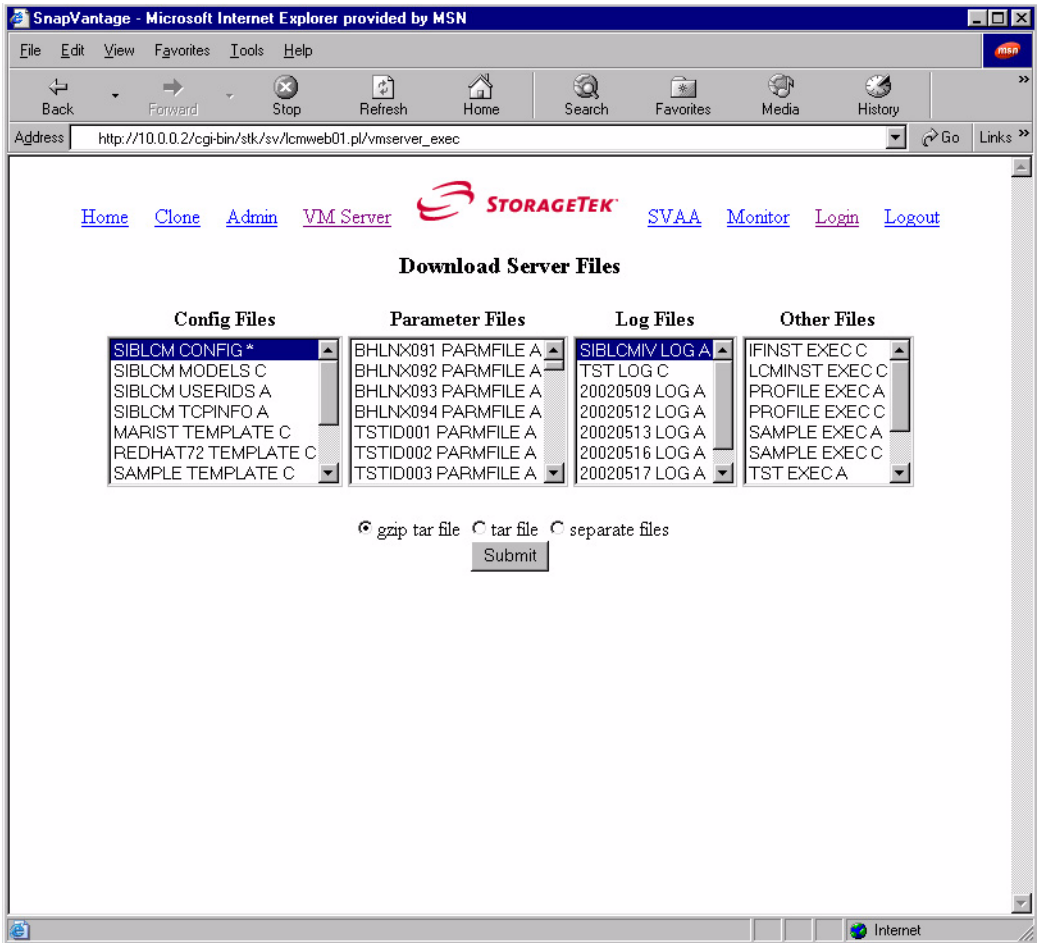
VM Server Administration

Select **VM Server** from either the SnapVantage banner or the SnapVantage Home Page, and the SnapVantage **VM Server Administrator** page is displayed:



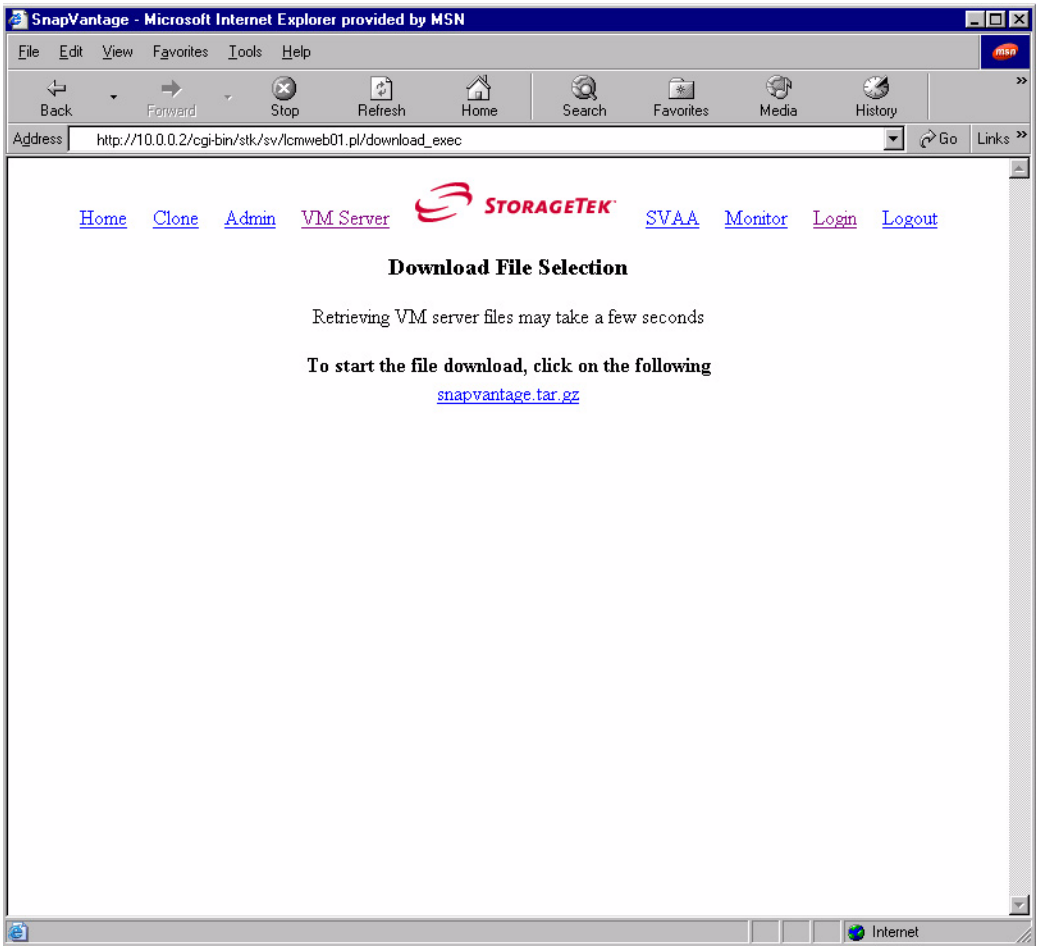
From the drop-down list, select actions to be performed on the VM server. In this example, the current log file has been selected. This screen also provides an area to request execution of a CMS command and a **Filelist** facility.

If you select **download SnapVantage files**, the **Download Server Files** page is displayed:



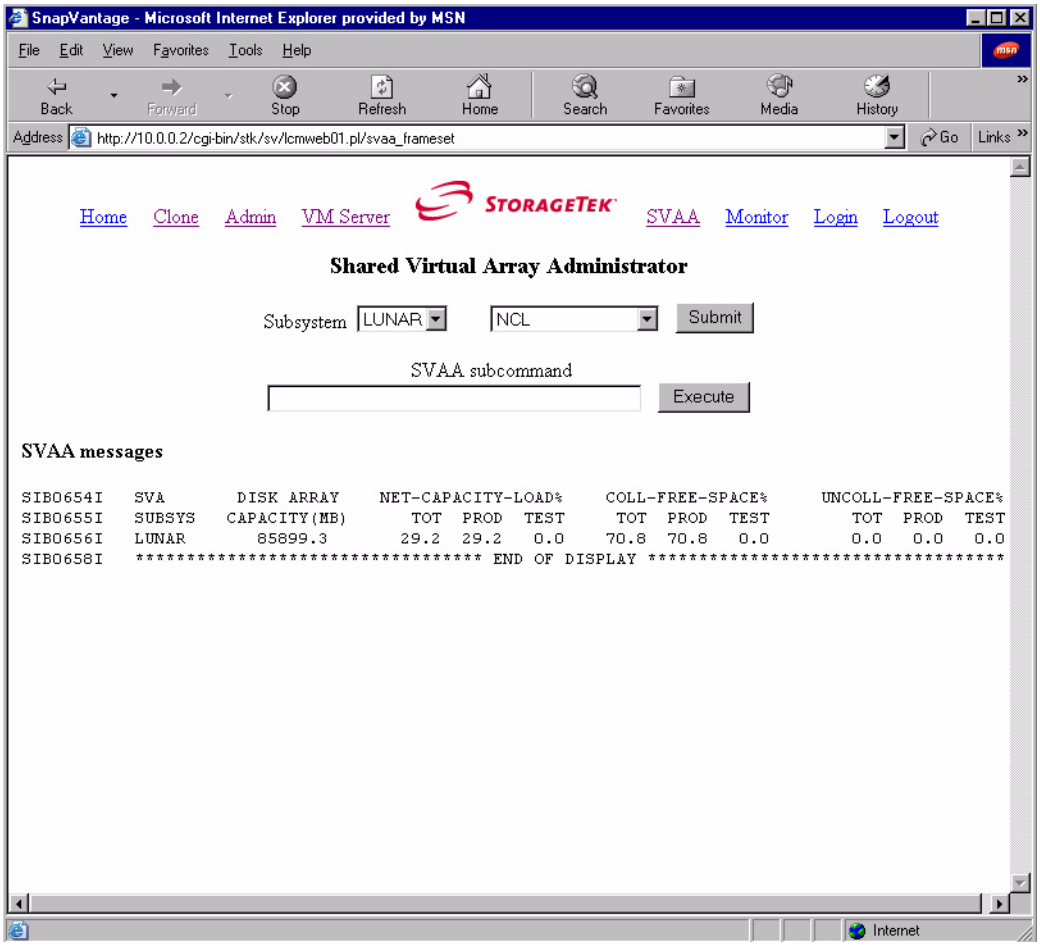
This screen lets you select SnapVantage files to be collected and downloaded to the SnapVantage Web Server in the **cgi-bin/stk/tmp** directory. StorageTek customer support may request files to help resolve a user's problem.

After clicking Submit, the **Download File Selection** page enables you to initiate the process of downloading files to your PC.



Shared Virtual Array Administrator

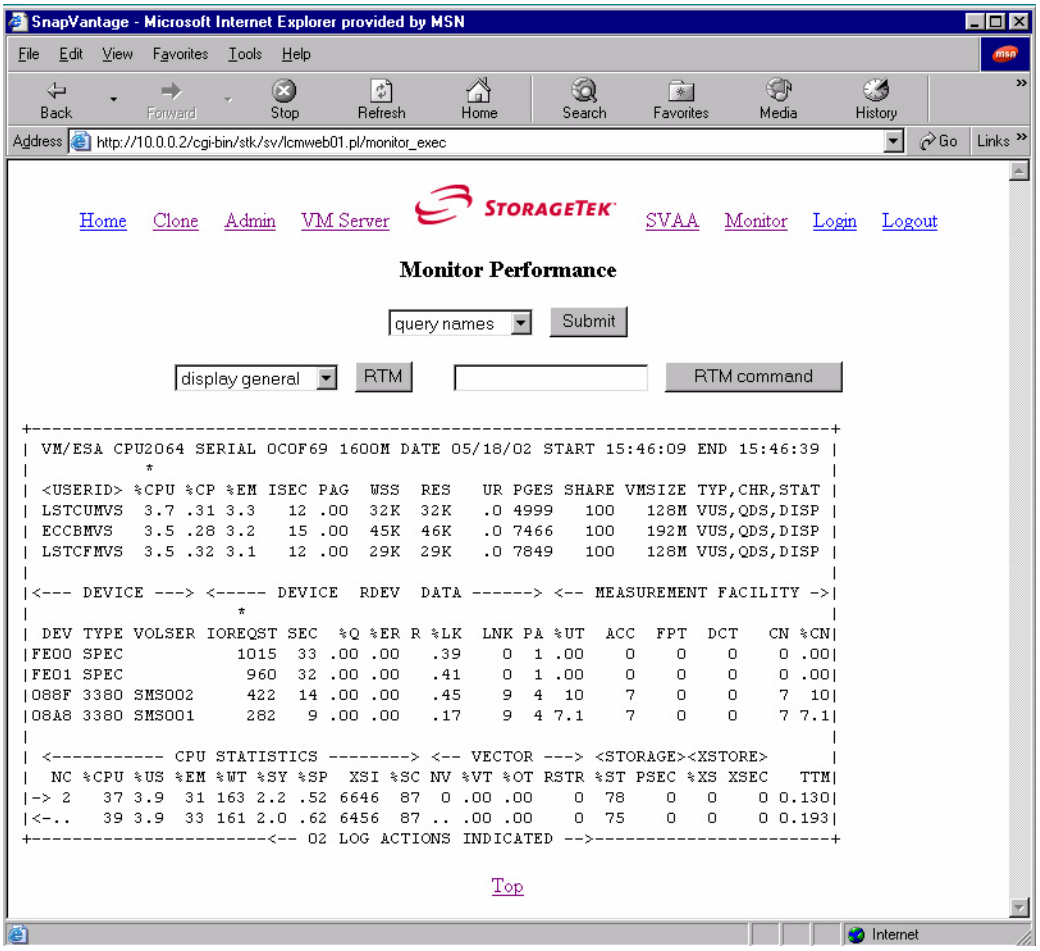
Select **SVAA** from either the SnapVantage banner or the SnapVantage Home Page, and the SnapVantage **Shared Virtual Array Administrator** page is displayed:



This screen lets you display information on the SVAs that are connected to the VM system hosting the VM server. The pull-down list allows one to select NCL usage, functional devices and I/O interfaces.

Monitor Linux Server Performance

Select **Monitor** from either the SnapVantage banner or the SnapVantage Home Page, and the SnapVantage **Monitor Performance** page is displayed:



This screen lets you display performance information and interact with IBM's Real Time Monitor. This is an optional performance monitor for VM performance as it pertains to running Linux guests.

Chapter 6. Using SnapVantage Command Interface

The SnapVantage administrator software may also be accessed via a Command Line Interface (CLI). The CLI is available from either the Linux or VM environments. Authentication consists of:

1. The request must be generated from a host that is defined as a trusted client (-TC).
2. The VM userid and password must be valid.

Linux CLI – invoked with lcmcli.pl

General Syntax: lcmcli.pl vmhost port vmid vmpw request

Example of version request:

```
#*#linux01: ./lcmcli.pl 129.80.122.65 41481 donj pw version
SnapVantage V1.00
Return code is 0
#*#linux01
```

VM CLI – invoked with siblcmcl

General Syntax: siblcmcl vmhost port vmid vmpw request

Example of version request:

```
siblcmcl 129.80.122.65 41481 donj pw version
SnapVantage V1.00
Return code is 0
Ready; T=0.01/0.01 13:26:30
```

CLI command parameters (common to Linux and VM):

vmhost	The IP address or hostname of the VM system hosting the STKLCM virtual machine.
port	TCP/IP port for the SnapVantage VM server
vmid	Authorized VM userid
vmpw	VM password
request	The CLI request type

clone	Create a Linux copy.	
	model	Linux model distribution name
	-D	Turn debug mode on for this command
	-M	Don't display boot messages
	-V	Syntax validation only. Don't execute the clone.
	-W	Wait for the boot process to timeout
	-LAP 0-3	Autolog priority
	-LED date	Expiration date in dd/mon/yyyy format
	-SC id	Spool the clone's console to this userid
	-LBD bootdev	Boot device minidisk address
	-LDN distname	Linux distribution name
	-LID userid	VM userid to select as the clone
	-LVS mb	Virtual storage size in megabytes
	-RPW rootpw	New root password for the clone
	-LDD devdef	Minidisk device definitions
boot	Perform a Linux system boot.	
	id	VM userid to autolog and boot Linux
	-A	Autolog only. Don't wait for the boot messages.
	-D	Turn debug mode on for this command.
	-M	Don't display boot messages.
	-W	Wait for the boot process to timeout.
	-VS mb	Virtual storage size in megabytes
	-SC id	Spool the clone's console to this userid.
	-LC cmd	Linux command to execute after boot completes.
delete	Remove a Linux server.	
	id	Linux userid defined to SnapVantage.
	-D	Turn debug mode on for this command.
force	Perform a VM logoff command.	
	id	Linux userid defined to SnapVantage.
	-D	Turn debug mode on for this command.
	-M	Don't display logoff messages.
lnxcmd	Execute a Linux command.	
	id	Linux userid defined to SnapVantage.
	-D	Turn debug mode on for this command.
	-M	Don't display logoff messages.
	cmd	Command sent to the Linux userid for execution.

cmscmd	Execute a CMS command on the VM server userid.	
	-D	Turn debug mode on for this command.
	-M	The command string is mixed case.
	-P	Include server parameters in the command string.
	cmdstring	CMS command string.
cmsfile	Return CMS file info from the VM server userid.	
	-C cnt	Max nnumber of lines to return.
	-D	Turn debug mode on for this command.
	-G	Return a CMS file (GET).
	-H	Include a header line.
	-L	Perform a LISTFILE command.
	-M	The file identifier is mixed case.
	fn ft fm	CMS filename, filetype and filemode.
cpcmd	Execute a CP command on the VM server userid.	
	-B bufsize	REXX buffer size (default is 64k).
	-D	Turn debug mode on for this command.
	-M	The command string is mixed case.
	cmdstring	CP command string
rtmcmd	Execute an IBM Real Time Monitor command.	
	-D	Turn debug mode on for this command.
	cmdstring	RTM command string
svaacmd	Execute an SVAA subcommand.	
	-D	Turn debug mode on for this command.
	-M	The command string is mixed case.
	cmdstring	SVAA subcommand
template	Return a Linux template file with substitution.	
	-D	Turn debug mode on for this command.
	distname	Model filename. Filetype is TEMPLATE.
login	Login authenication request.	
echo	Communication validation request.	
	parms	Parameters to return (echo).
version	Return the VM server version (v.rr)	
shutdown	Send a shutdown request to all active servers.	
startup	Send a boot request to all defined Linux servers.	

Chapter 7. Diagnostics and Maintenance

Diagnostics

Diagnostic techniques for SnapVantage are dependent upon the functional area of the product that the problem is related to. Extensive logging techniques are used to capture data in real time.

The following functional areas are described in this section:

1. STKLCM VM server
2. SnapVantage GUI and/or local Web Server
3. Linux guest image - Model system or Clone system

STKLCM VM Server

Log files provide the information necessary to diagnose most problems in SnapVantage. The VM server closes log files automatically at the end of each day.

- STKLCM 191 disk contains log files if enabled in SIBLCM CONFIG
- Spooled console files are written for the VM server and Linux Guests (during the clone process) if enabled in SIBLCM CONFIG file.
- Debug mode may be enabled for problem re-creation to provide more verbose log messages

Configuration files provide the framework for the VM server environment. Problems may be diagnosed by reviewing the pertinent configuration parameters.

SIBLCM	Server configuration
TCPINFO	Linux image network configuration
MODELS	Model server distributions
USERIDS	Matching Linux userids/Assignment information
TEMPLATES	Individual model image templates

Parameter files define the directives used for the SnapVantage clone process. They are retained for ongoing Linux administration, such as booting and deleting.

Other files may consist of profiles, user exits, execs, and SIB macros. All user exits are considered optional and debugging is the responsibility of the user. REXX tracing may be useful for diagnosing user exit problems.

Data Collection. All of these VM diagnostic files are CMS text files that can be browsed or printed using standard CMS techniques. A more user-friendly method is to look at them interactively through the SnapVantage GUI (web browser). The files may be captured on your local workstation for further analysis or ftp'd to a

support site. This is available through a SnapVantage GUI function, VM SERVER "download SnapVantage files". It allows selection of single or multiple files, optionally providing file compression.

SnapVantage GUI / Local Web Server

Problems in this area are generally within the execution of cgi-scripted dynamic html pages in:

- The presentation (display) of the html pages/images by the web-browser, or
- The cgi hosting environment provided by the local Apache Web Server.

Tracing. The primary cgi-script can be run in debug mode if **tracing on** is selected from the GUI login screen. This option should be selected only if directed by StorageTek support.

Data Collection. The settings for this web-server environment are captured during the VM SERVER "download SnapVantage files" option. The file **snapvantage.txt** will contain all of these environmental variables for problem determination.

Screen captures/prints may also be useful in documenting GUI problems.

Note: Most GUI functions or commands may also be invoked via the Command Line Interface for additional problem isolation.

Linux Guest Image - Model System or Clone System

A majority of problems that may be encountered in the Linux Guest system are independent of the SnapVantage product. The model image must be configured and tested as a viable Linux system prior to adoption of the SnapVantage clone and administration process. Once the clone operation is invoked there are the following key areas that may be customized by SnapVantage:

File system copy. SnapVantage is designed to copy a root file system as a minimum, and also may copy additional files systems or swap disk. File system integrity may be confirmed by read or write accessibility. The file system copy may be validated from the output of a clone operation.

Following is an example of the successful copy of a boot and swap disk using the SnapShot method.

```
08:33:41 SIBLCMBL: S : CTLNX01 : 0151 : GIGGLES : 0151 : 3000 : 3390 : boot
08:33:41 SIBLCMBL: CP LINK * 0151 0151 M
08:33:41 SIBLCMBL: CP LINK CTLNX01 0151 AS 1FFF RR
08:33:41 SIBLCMBL: SnapShot took 0.095 seconds to copy 3000 cylinders
08:33:41 SIBLCMBL: S : CTLNX01 : 0150 : GIGGLES : 0150 : 200 : 3390 : swap
08:33:41 SIBLCMBL: CP LINK * 0150 0150 M
08:33:41 SIBLCMBL: CP LINK CTLNX01 0150 AS 1FFF RR
08:33:41 SIBLCMBL: SnapShot took 0.100 seconds to copy 200 cylinders
```

File system mount initialization. SnapVantage is designed to allow the user to initialize and mount variable sized file systems and/or LVM groups. File system integrity may be confirmed by read or write accessibility. The file system initialization may be validated from the output of a clone operation. For troubleshooting purposes, some template file parameters (device descriptors) are available for selection from the clone screen or template (see Table 4-5).

Following is an example of the verbose (-v) output.

```
perl /root/stk/mntinit.pl -v /newfilesys 0152
----- file /proc/dasd/devices records -----
0150(ECKD) at ( 94: 0) is dasda:active at blocksize: 4096, 36000 blocks, 140 MB
0151(ECKD) at ( 94: 4) is dasdb:active at blocksize: 4096, 540000 blocks, 2109 MB
0152(ECKD) at ( 94: 8) is dasdc:active at blocksize: 4096, 180000 blocks, 703 MB
----- $UNIT hash /proc/dasd/devices -----
0150 = dasda
0151 = dasdb
0152 = dasdc
----- $DASD hash /proc/dasd/devices -----
dasda = 0150
dasdb = 0151
dasdc = 0152
----- file /etc/fstab records -----
/dev/dasda1 swap swap defaults 0 0
/dev/dasdb1 / ext2 defaults 1 1
proc /proc proc defaults 0 0
----- $MNTPT hash /etc/fstab -----
/ = /dev/dasdb1 ext2
swap = /dev/dasda1 swap
/proc = proc proc
----- $DEVPT hash /etc/fstab -----
/dev/dasda1 = swap swap
/dev/dasdb1 = / ext2
proc = /proc proc
mntinit -- Mounting /newfilesys ext2 file system on /dev/dasdc1
mntinit -- mkdir /newfilesys
mntinit -- mke2fs -b 4096 /dev/dasdc1
mntinit -- mount -t ext2 /dev/dasdc1 /newfilesys
mntinit -- cp /etc/fstab /etc/fstab.svcopy
mntinit -- The following line will be added to the /etc/fstab file: /dev/dasdc1 /newfilesys ext2
defaults 1 2 mntinit -- df -h
#*#:
```

Network Identity. Assuming the model system is configured correctly, along with the TCPINFO configuration file, the newly cloned image should be accessible by such network functions as ping, telnet, or ftp. This type of functionality testing will verify that the "change identity" process worked correctly. The network parameters may be validated as part of the output of a clone operation.

Following is an example.

```
root/stk/chgident.sh ...
Hostname = ctlnx01
New Hostname = ctlnx03
Old Host IP = 129.80.129.156
New Host IP = 129.80.129.158
Old Peer IP = 129.80.123.254
New Peer IP = 129.80.123.254
Old DNS IP = 129.80.5.148
New DNS IP = 129.80.16.241
Distribution = suse
SED CMD = /bin/sed -e 's/129.80.129.156/129.80.129.158/g' -e 's/ctlnx01/ctlnx03/g' -e
's/129.80.123.254/129.80.123.254/g' -e 's/129.80.5.148/129.80.16.241/g'
#*#:
```

Software Maintenance

SnapVantage is packaged within an SVAA VM PTF. Each PTF is part of the base SVAA product ID SSIB310V. The first step in applying maintenance is to install the SVAA PTFs, normally distributed in a cumulative fashion from a PTF tape or downloadable file. Refer to the installation instructions that are provided with the download file or PTF tape. The instructions are also in the *SVAA for VM Installation, Customization, and Maintenance* guide and on the StorageTek Customer Resource Center (CRC): http://www.storagetek.com

Maintenance Files:

SVAA RUN Disk - Contains all of the executable code to run the STKLCM VM Server. The only exceptions are sample configuration files and profiles, which are rarely updated once the base installation is complete.

SVAA SIBSAMP MACLIB - This is a repository of sample members containing templates for configuration files and profiles. It also contains all of the Linux code elements. These Linux files consist of three binary tar archive files:

LCMCGI	Web server cgi-scripts (target system is local web server)
LCMIMG	Web server image files (target system is local web server)
LCMROOT	Root scripts to enable clone process (target system is each Model image)

Maintenance Process:

For STKLCM VM Server maintenance the steps required are:

1. Back up existing MERGE and RUN disks.
2. Load and merge the PTF files using EXEC SSSIB310.
3. Generate a new RUN disk using EXEC GENSVAA.
4. Re-link the RUN disk from STKLCM.

For Linux maintenance the steps required are:

1. Back up STKLCM 191 and 193 disks.
2. Depending upon which elements have been updated, you will extract files from SIBSAMP MACLIB to STKLCM 193 disk with the appropriate naming conventions. Linux files have an extension of "tar" (tar archive format). You can do this following Step 10 in this document. In the COPY steps, take care not to overlay any of your existing configuration files.
3. ftp the tar files (using binary transfer) to the target Linux host and expand and install the files on Linux using the tar command. You can do this following Steps 12 and 13 in this document.

Note: Fixes are normally distributed as cumulative maintenance with the intension of doing a complete replacement of all of the Linux tar files. Check the PTF cover letter (file type of SCF) under “SPECIAL CONDITIONS” for information on individual fixes. If you want to update from a single SIBSAMP MACLIB member, a utility is provided to extract this file. The syntax for the SIBSAMPX utility is:

SIBSAMPX maclib_member target_filename target_filetype target_filemode

Once this file is extracted, it must be copied or FTP'd using the installation process appropriate for this member.

Appendix A. VM Server Configuration File Worksheet

You can use this worksheet to gather the essential parameters for SnapVantage VM server configuration. This information is used to update the SIBLCM CONFIG file (installation Step 16).

Authorized VM Users (-AU)	
Trusted Client Hosts (-TC)	
TCPIP Port Numbers (-P)	
Software Key (-KEY)	
Key Expiration Date (-FED)	
Key Customer Name (-FCN)	
Key Site Number (-FSN)	
Key Warning (in days) (-FWD)	
VM User Authentication (ON or OFF) (-UA)	
Directory Manager for Storage Pools (-DM)	
Directory Manager for User ADDs (-DDU)	
Directory User ADD Skeleton or Prototype (-DDP)	
Real Time Monitor Virtual Machine (-RTM)	
Session Timeout Value (-STO)	
VM User for Spool Files (-SC)	
Days for Log Files (-LF)	
Linux Userids File Name (-UF)	
TCP Info File Name (-TF)	
Models File Name (-DF)	
VM User for Messages (-OP)	
A Disk Warning Percent (-DUP)	

Appendix B. Virtual Server Name Worksheet

You can use this worksheet to gather and document the system names (hence the virtual machine names) of the virtual servers deployed by SnapVantage. This information will need to be written to the file SIBLCM USERIDS on the 191 (A) disk. Only userids defined to SnapVantage in "Step 14: Configure SIBLCM USERIDS File," on page 28 are recognized by SnapVantage for assignment to virtual servers it deploys. To use this worksheet for the assignment of a large number of userids, duplicate the second page of this table before recording this information.

Userid	Matching

Userid	Matching

Userid	Matching

Userid	Matching

Appendix C. TCP/IP Address List Worksheet

You can use this worksheet to gather, assign, and document the IP addresses, and associated information, to be defined to SnapVantage in the SIBLCM TCPINFO file on the 191 (A) disk. Only IP addresses defined to SnapVantage in “Step 15: Configure SIBLCM TCPINFO File,” on page 30 are recognized by SnapVantage for assignment to virtual servers it deploys. To use this worksheet for the assignment of a large number of IP Addresses, duplicate the second page of this table before recording this information.

Host Name	IP Address	TCP/IP Userid	Peer IP Address	Device Name	Link Type	Link Connection Information			
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Host Name	IP Address	TCP/IP Userid	Peer IP Address	TCP/IP Link ID	Link Type	Link Connection Information			
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Appendix D. Model Template Worksheet

You can use this worksheet to gather the parameters for a Model Template file. Use one worksheet for each Model Linux image, as described in installation Step 18.

Linux Distribution Name (-LDN)	
Linux Boot Disk Device (-LBD)	
Root Password (-RPW)	
Model Root Password (-MPW)	
Model Host Name (-MSN)	
Model IP Address (-MIP)	
Model Peer IP (-MPIP)	
Model DNS IP (-MDNS)	
Linux Expiration Date (-LED)	
Linux Autolog Priority (-LAP)	
Linux Virtual Storage Size (-LVS)	
Linux Device Definitions (-LDD)	

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