User Experience Implementing SSL and Terminal Servers in z/VM 6.1

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Introduction

- This presentation describes how a user implemented the SSL TCP/IP server for secure access to z/VM (version 6.1) as well as how the new Terminal Server has been implemented for access to virtual Linux servers. The goal of this implementation was to achieve a more secure and centralized means of accessing VM and the Linux servers running under it. This session will show a before and after configuration and the steps taken to achieve the stated goals in a step-by-step how-to fashion.
- Another incentive (perhaps even the driving force) behind accomplishing these goals was to satisfy audit findings
Overview

Part 1 - Implementing an SSL Server on z/VM 6.1
  • What is an SSL Server? Why do we want to use it?
  • What is needed for implementation
  • Steps for basic implementation
    • Overview of steps
    • Recipe
  • Next steps

Part 2 - Implementing a Terminal Server on z/VM 6.1
  • What is a Terminal Server? Why do we want to use it?
  • What is needed for implementation
  • Steps for basic implementation
    • Overview of steps
    • Recipe
  • Next steps
Overview (Continued)

• Summary

• Questions
Part 1 - Implementing an SSL Server

What is the (CMS-based) SSL Server for z/VM?

• SSL (Secure Sockets Layer) was developed to provide point-to-point encryption of TCP/IP traffic
• Standardized by RFC 2246 as TLS (Transport Layer Security)
• Provides security in a z/VM environment for any server associated with a TCP/IP stack
• Prior to z/VM 5.4, only a Linux-based SSL Server option was available
• A CMS-based SSL Server was introduced with z/VM 5.4
• It’s a component of TCP/IP that ships with z/VM 6.1
Part 1 - Implementing an SSL Server

Why do we want to use it?

• Allows us to access VM via a Telnet client, such as IBM Personal Communications, in a secure fashion
• Allows us to perform FTP-based file transfers in a secure fashion
• SSL Server references that this presentation is based on:
  • Presentation: **z/VM SSL Server Update** by Brian Hugenbruch
Part 1 - Implementing an SSL Server

What is needed for implementation

• Install z/VM 6.1 + configure with basic TCP/IP access
  • Either follow instructions from IBM that come with z/VM 6.1, or
  • Use the Virtualization Cookbook for SLES11 (Redbook SG24-7931-00) to install z/VM 6.1
• Make sure that PTF UK59536 is applied
  • Provides required updates for the SSL & TCP/IP components
• The implementation that follows is based on a z/VM 6.1 system after the initial installation of the shipped configuration and then applying PTF UK59536
• Assumes the default VM System ID is used – ZVMV6R10
Part 1 - Implementing an SSL Server

Overview of steps to implement an SSL Server

- Determine the SSL Server Configuration For Your Installation
- Update the TCP/IP server configuration file (PROFILE TCPIP)
- Update the DTCPARMS file for the TCP/IP server
- Update the DTCPARMS file for the SSL Server and the (new) DCSS Management Agent server
- Update the DTCPARMS file for the SSL Server Daemon
- Set up the Certificate Database
- Bounce TCPIP to start up the SSL Server
Part 1 - Implementing an SSL Server

Determine the SSL Server Configuration For Your Installation

• Secure communications support can be provided via one of the following SSL configurations:
  • A single-instance SSL server, or
  • A server "pool," for which multiple SSL servers are employed

• We are choosing to implement the single-instance SSL server option to keep it simple.
Part 1 - Implementing an SSL Server

Update the TCP/IP Server Configuration File (PROFILE TCPIP)

- Logon to TCPMAINT and do the following:
- Copy PROFILE TCPIP D1 to ZVMV6R10 TCPIP D1
  - Command: COPYFILE PROFILE TCPIP D ZVMV6R10 = D
- Note: ‘ZVMV6R10’ is the system name. When TCPIP is started, it looks for file names = system name first, i.e. sysname TCPIP, sysname DTCPARMS, etc.
- Xedit ZVMV6R10 TCPIP D and add the following SSL Server related statements:
  - SSLSERVERID SSLSERV TIMEOUT 60
  - SSLLIMITS MAXSESSIONS 1000 MAXPERSSLSERVER 100
Part 1 - Implementing an SSL Server

Update the DTCPARMS File for the TCP/IP Server

• Include a :DCSS_Parms. tag for the TCP/IP server with which the SSL server is to provide secure communications support.

• Copy SYSTEM DTCPARMS D1 to ZVMV6R10 DTCPARMS D1
  • Command: COPYFILE SYSTEM DTCPARMS D ZVMV6R10 = D

• Xedit ZVMV6R10 DTCPARMS D and update the TCPIPF server definition
Part 1 - Implementing an SSL Server

Update the DTCPARMS File for the TCP/IP Server

- Xedit ZVMV6R10 DTCPARMS D and update the TCPIP server definition:

  :nick.TCPIP :type.server
  :class.stack
  :attach.1130-1132
  :DCSS_Parms.<DEFAULT>
Part 1 - Implementing an SSL Server

Update the DTCPARMS file for the SSL Server and the DCSS Management Agent server

• Add the following definitions:

  :nick.SSLSERV    :type.server
                     :class.ssl
                     :stack.TCPIP

  .*

  :nick.SSLDCSSM  :type.server
                   :class.ssl_dcss_agent
                   :stack.TCPIP
                   :for.SSLSERV
Part 1 - Implementing an SSL Server

Update the DTCPARMS file for the SSL Server Daemon

• Add the following definition:
  .* Secure Socket Layer (SSL) daemon
  :nick.ssl :type.class
  :name.SSL daemon
  :command.VMSSL
  :runtime.C
  :diskwarn.YES
  :Admin_ID_list.TCPMAINT GSKADMIN
  :memory.256M
  :mixedcaseparms.YES
  :mount. /..VMBFS:VMSYS:ROOT/ / ,
  /..VMBFS:VMSYS:SSLSERV/ /tmp ,
  /..VMBFS:VMSYS:GSKSSLDB/ /etc/gskadm
  :parms.KEYFile /etc/gskadm/TstCerts.kdb

• Logoff TCPMAINT
Part 1 - Implementing an SSL Server

Setup the Certificate Database

- Log on the GSKADMIN user ID and allow its default PROFILE EXEC to run
- Invoke the gskkyman utility. A menu is displayed:

Database Menu

1 - Create new database
2 - Open database
3 - Change database password
4 - Change database record length
5 - Delete database
6 - Create key parameter file
7 - Display certificate file (Binary or Base64 ASN.1 DER)

0 - Exit program
Part 1 - Implementing an SSL Server

Setup the Certificate Database

Select option 1 – Create new database, and then respond to the following prompts:

Enter key database name (press ENTER to return to menu): 
   TstCerts.kdb
Enter database password (press ENTER to return to menu): 
   tstadmin
Re-enter database password:  tstadmin
Enter password expiration in days (press ENTER for no expiration): 
   <Enter>
Enter database record length (press ENTER to use 5000):  <Enter>

Key database /etc/gskadm/TstCerts.kdb created.
Part 1 - Implementing an SSL Server

Setup the Certificate Database

- Select option 10 - Store database password (you should receive the following reply):
  Database password stored in /etc/gskadm/TSTCERTS.sth

- Exit the gskkyman program by selecting option 0.

- Issue the OPENVM commands that follow to confirm that the necessary database files have been created and to list the permissions of these files.
### Part 1 - Implementing an SSL Server

#### OPENVM Commands

- **openvm list /etc/gskadm/**

  ```
  Directory = '/etc/gskadm/'
  Update-Dt  Update-Tm  Type  Links          Bytes  Path name component
  07/31/2011 19:08:44   F        1          60080  'TstCerts.kdb'
  07/31/2011 19:12:57   F        1             80  'TstCerts.rdb'
  07/31/2011 19:11:48   F        1            129  'TstCerts.sth'
  ```

- **openvm list /etc/gskadm/** (own)

  ```
  Directory = '/etc/gskadm/'
  User ID    Group Name  Permissions Type  Path name component
  gskadmin   security    rw- --- --- --- F    'TstCerts.kdb'
  gskadmin   security    rw- --- --- --- F    'TstCerts.rdb'
  gskadmin   security    rw- --- --- --- F    'TstCerts.sth'
  ```
Part 1 - Implementing an SSL Server

OPENVM Commands

• Issue the OPENVM PERMIT commands that follow to allow the SSL server to access the newly-created key database:
  
  openvm permit /etc/gskadm/TstCerts.kdb rw- r-- ---
  
  openvm permit /etc/gskadm/TstCerts.sth rw- r-- ---

• Issue the OPENVM LIST command that follows to confirm that r (read) has been added to the “group” permissions for the key database and password stash files:
  
  openvm list /etc/gskadm/ (own

  Directory = '/etc/gskadm/'

  User ID   Group Name   Permissions Type Path name component
  gskadmin  security     rw-  r-- --- F  ‘TstCerts.kdb’
  gskadmin  security     rw-  --- --- F  ‘TstCerts.rdb’
  gskadmin  security     rw-  r-- --- F  ‘TstCerts.sth’

• Logoff GSKADMIN
Part 1 - Implementing an SSL Server

• With the key database now in place, the SSL server can be initialized to confirm it has access to this database.

• Bounce TCPIIP and see if the SSL Server starts:
  • To shutdown TCPIIP: FORCE TCPIIP
  • To restart TCPIIP: XAUTOLOG TCPIIP

• Issue the ‘Query Names’ command to confirm that SSLSERV & SSLDCSSM are active.

• The key database can now be populated with the appropriate server and CA certificates required to provide SSL-protected communications for your installation. For more information, see z/VM: TCP/IP Planning and Customization and TCP/IP User’s Guide manuals.
Part 1 - Implementing an SSL Server

Next Steps

• SSL can now be used to setup secure access to VM via a Telnet client, such as IBM Personal Communications
• SSL can now be used to perform FTP-based file transfers in a secure fashion
Part 2 - Implementing a Terminal Server

What is a Terminal Server?

- A *terminal server* is a Linux instance that provides access to terminal devices on other Linux instances, called *target systems*.
- The terminal server and all target systems run as guest operating systems of the same z/VM instance.
- Terminal server and target systems are connected through the z/VM Inter-User Communication Vehicle (IUCV).
Part 2 - Implementing a Terminal Server

Why do we want to use it?

• From the terminal server, administrators can access terminal devices on target systems without requiring direct TCP/IP connections to the target systems.

• You can use a terminal server to:
  • Increase availability by providing emergency access to target systems if the primary network for these systems fails.
  • Heighten security by separating user networks from administrator networks or by isolating sensitive Linux instances from IP networks.
  • Simplify systems administration by providing a central access point to target systems.
Part 2 - Implementing a Terminal Server

Terminal Server references this presentation is based on

- *How to Set up a Terminal Server Environment on z/VM* (SC34-2596-00)
- *Device Drivers, Features, and Commands* (SC33-8411-11)
- *The Virtualization Cookbook for SLES 11 SP1* (SG24-7931-00)
Part 2 - Implementing a Terminal Server

What is needed for implementation

- This presentation is based on SUSE Linux Enterprise Server Version 11 Service Pack 1 (SLES11 SP1)
- Use the *Virtualization Cookbook for SLES11* (Redbook SG24-7931-00) to create a cloning server
- 2 servers are created from the cookbook:
  - S11S1CLN, the cloning server
  - S11S1GLD, the Golden Image server
- 2 servers are then cloned for Terminal Server:
  - TRMSRV, a cloned server for use as the Terminal Server
  - TSTSRV, a client that is used for testing Terminal Server
Part 2 - Implementing a Terminal Server

Overview of Steps to Implement a Terminal Server

- Terminal Server code already included in SLES11 SP1
- Update VM Directory for IUCV Access
  - Create a separate profile for Terminal Server - TRMSRV
  - Update profiles for IUCV access
- Setup the TRMSRV server as a Terminal Server
  - Define a user ID for testing
  - Define access authorizations
- Setup the TSTSRV server as a Terminal Server Client
  - Define a user ID for testing
  - Define terminal types
Part 2 - Implementing a Terminal Server

Terminal Server code already included in SLES11 SP1

• Most of the work involves minor updates, as the Terminal Server code is contained in the s390-tools package, which is pre-installed in SLES11 SP1.
• S390-tools package version 1.8.1 or later is required.
• We will focus on basic functionality, however, there are several additional features that can be exploited, such as session logging and the ability to replay a session.
Part 2 - Implementing a Terminal Server

Update the VM Directory for IUCV Access

• Logon to MAINT and xedit the User Direct file
• The LNXDFLT profile entry is created via the cookbook
• Make a copy of the LNXDFLT profile entry and call it TERMSERV
• Add the IUCV ANY statement to the LNXDFLT profile

```plaintext
PROFILE LNXDFLT
  IPL CMS
  MACHINE ESA 4
  CPU 00 BASE
  IUCV ANY
...
```
Part 2 - Implementing a Terminal Server

Update the VM Directory for IUCV Access

• Add the IUCV ANY and MAXCONN statements to the TERMSERV profile (copied from LNXDFLT)

```
PROFILE TERMSERV
  IPL CMS
  MACHINE ESA 4
  CPU 00 BASE
  IUCV ANY
  OPTION MAXCONN 128
...
```
Part 2 - Implementing a Terminal Server

Update the VM Directory for IUCV Access

• Change the profile for the TRMSRV entry to TERMSERV, so it is similar to the following:

```
USER TRMSRV   NEWSYS   512M  1G G
INCLUDE TERMSERV
OPTION APPLMON
MDISK 100 3390  00001  03338  LNX062  MR  LNX4VM  LNX4VM  LNX4VM
MDISK 101 3390  03339  03338  LNX062  MR  LNX4VM  LNX4VM  LNX4VM
```
Part 2 - Implementing a Terminal Server

Setup the TRMSRV server as a Terminal Server

- Login to TRMSRV as root
- Define a userid – jmoling
  
  ```
  useradd -s /usr/bin/ts-shell -G ts-shell jmoling
  ```

- Define a home path
  
  ```
  mkdir /home/jmoling
  ```

- Define Authorizations
  
  ```
  cd /etc/iucvterm/
  vi ts-authorization.conf
  Add:       jmoling=list:mebmon
  Save changes:      :wq
  ```

- Bounce TRMSRV so changes take affect: Reboot
Part 2 - Implementing a Terminal Server

Setup the TSTSRV server as a Terminal Client

• Login to TSTSRV as root
• Define a userid – jmoling
  
  `useradd -s /usr/bin/ts-shell -G ts-shell jmoling`

• Define a home path
  
  `mkdir /home/jmoling`

• Edit inittab and add a terminal definition
  
  `Cd /etc
  Vi zipl.conf
  Add: i1:2345:respawn:/usr/bin/iucvttty lxterm1
  Save changes: :wq`
Part 2 - Implementing a Terminal Server

Setup the TSTSRV server as a Terminal Client

- Edit zipl.conf:
  
  vi /etc/zipl.conf

- Add kernel parameters:
  
  hvc_iucv=2 console=hvc0 console=ttyS0 hvc_iucv_allow=mebmon,jmoling

- Save changes:
  
  :wq

- Update zipl:
  
  mkninitrd
  
  zipl

- Bounce TSTSRV so changes take affect:

  Reboot
Part 2 - Implementing a Terminal Server

Next Steps
1. Logging onto the TRMSRV Terminal Server

login as: jmoling
Using keyboard-interactive authentication.
Password: ........
Last login: Fri Aug 12 03:15:36 2011 from ...
Welcome to the Terminal Server shell.
Type 'help' to get a list of available commands.
Part 2 - Implementing a Terminal Server

Next Steps

2. Displaying the Help command

jmoling@ts-shell> help
Terminal Server shell help

Available commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>list</td>
<td>List authorizations.</td>
</tr>
<tr>
<td>connect &lt;vm_guest&gt;</td>
<td>Connect to specified z/VM guest virtual machine.</td>
</tr>
<tr>
<td>terminal [&lt;identifier&gt;]</td>
<td>Display or set the terminal identifier.</td>
</tr>
<tr>
<td>q</td>
<td>quit</td>
</tr>
<tr>
<td>help</td>
<td>Display help information.</td>
</tr>
<tr>
<td>version</td>
<td>Display version information.</td>
</tr>
</tbody>
</table>
Part 2 - Implementing a Terminal Server

Next Steps

3. Connecting to the TSTSRV client server

jmoling@ts-shell> connect tstsrv lxterm1
ts-shell: Connecting to tstsrv (terminal identifier: lxterm1)...

TSTSRV login: jmoling
Password:
Last login: Fri Aug 12 03:37:05 CDT 2011 from MEBTRM on pts/0
Directory: /home/jmoling
Sat Aug 13 00:36:35 CDT 2011
jmoling@MEBMON:~>
Summary

SSL Server

- SSL is now available to setup secure access to VM via a Telnet client, such as IBM Personal Communications
- SSL is now available to setup FTP-based file transfers in a secure fashion

Terminal Server

- The Terminal Server can now be used to connect to other servers that have been setup as a client
Thank You For Attending!

- Questions?

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