In Service to z/VM and Linux on Z

Z/VM Workshop Redux 2011
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Now Showing: In Service to z/VM and Linux on z

Abstract: In this presentation the benefits of building a service zone LPAR for shops with multiple z/VM LPARs are shown. The service LPAR is used to build, service, create and manage z/VM production LPARs and Linux virtual machines. The service zone is the place to remote control other LPARs using standard VM tools in CP, CMS, DIRMAINT and RSCS. Networking using hipersockets in a nicely wrapped CEC box is discussed. The service zone is not your systems programmer playpen sand box!
Presentation Goals

- Describe the design and use of a service zone z/VM LPAR.
- Service zone configuration and definitions.
- Command examples.
Service LPAR sees the entire I/O configuration as defined in the IOCDS. Great for systems management. Other LPARs only see the I/O devices required for their use.
Backups and restores of DASD are performed in the SERVICE zone LPAR. Different techniques include FLASHCOPY and then eventual backup from z/OS, and remotely quiescing Linux machines on the other LPARs and then backing up.

Restores are done on the full volume.

Service initiates backup of 3390 volumes on all LPARs.
"find all see all"

SYSTEM CONFIG

: DEVICES, SENSED 0000-FFFF, ONLINE_AT_IPL 0000-FFFF :

HIPERSOCKET

SERVICE LPAR

3E83 3E84 4567 4568 E321 E322

OSA OSA OSA
SYSTEM CONFIG

DEVICES,
SENSED 0000-FFFF,
OFFLINE_AT_IPL 0000-FFFF,
ONLINE_AT_IPL,
4567,
4568,
DF10-DF12, /* hiper*/
FED0-FED2 /* OSA */

The ONLINE_AT_IPL and OFFLINE_AT_IPL statements are OR'ed together. Great way to define only the I/O devices needed by the LPAR. Offline everything and online online what you need!

HIPERSOCKET
DF10-DF12
SYSTEM CONFIG

DEVICES,
SENSED 0000-FFFF,
OFFLINE_AT_IPL 0000-FFFF,
ONLINE_AT_IPL,
E321,
E322
DF13-DF15, /* hiper */
FED3-FED5 /* OSA */
VM “NIB” plus service zone has separate stack on OSA. Tn3270 from enterprise net only into the service zone. VMLINK to TCPIP1 on hipersocket to use CMS tn3270 client to signon onto other lpars. Note: these networks do not route to each other.
Linux v.m. enterprise networks use OSAs managed by vswitches. Linux IP addresses and ports used. No 3270 access available ... or required in the Linux networks.
Do not need many resources to be great! The two IFLs for the service zone should also be given a low weight in the LPAR profile (HMC). Memory could even be smaller!
RACF DB Sharing

The RACF database is shared by all LPARs. The DASD are marked as shared in the SYSTEM CONFIG. in LPARs. All RACF administration tasks may be performed in the SERVICE zone.
Linux Staging

- Linux virtual machines replicated in the service zone.
- Replicated machine than delivered to the appropriate LPAR.
- New service pack servers built in the service zone.
Z/VM 2\textsuperscript{nd} Level Systems

- One or more 2\textsuperscript{nd} level systems should be defined in the service zone – no need for 2\textsuperscript{nd} level z/VM guests in other LPARS

SERVICE ZONE

2\textsuperscript{nd} level z/VM Virtual machine with “almost full pack minidisks” 1 cylinder less than full pack!
The service zone provides systems management by using a stack of progressive services.
Hipersockets: “Network in a box”

- Network firmware connect between and within LPARs.
- Used to connect service zone to other LPARs.
Hipersockets: “Network in a box”

- Configurations: (QUERY OSA Class B command – there is no QUERY HIPER!)

**SERVICE LPAR:**
QUERY OSA
OSA BF18 ATTACHED TO TCPIP1 BF18 DEVTYPE HIPER CHPID BF IQD
OSA BF19 ATTACHED TO TCPIP1 BF19 DEVTYPE HIPER CHPID BF IQD
OSA BF1A ATTACHED TO TCPIP1 BF1A DEVTYPE HIPER CHPID BF IQD

**PRODUCTION LPAR:**
QUERY OSA
OSA BF00 ATTACHED TO TCPIP BF00 DEVTYPE HIPER CHPID BF IQD
OSA BF01 ATTACHED TO TCPIP BF01 DEVTYPE HIPER CHPID BF IQD
OSA BF02 ATTACHED TO TCPIP BF02 DEVTYPE HIPER CHPID BF IQD

**HIPERSOCKET IQD CHPID BF**

**hipersocket**
TCPIP virtual machines in each LPAR connected with hipersockets.

- Configuration sample from the service zone TCPIP1 TCPIP and from the production LPAR.
Service: VM TCPIP stack machine

TCPMAINT 198 Configuration files

system dtcpparms:
SYSTEM   DTCPARMS D1
:NICK.TCPIP1  :TYPE.SERVER  :CLASS.STACK
:ATTACH.BF18-BF1A

TCPIP1 TCPIP:
DEVICE HIPER HIPERS BF18

LINK HIPER QDIOIP HIPER NOFWD MTU 0 VLAN ANY HOME
192.168.150.1   255.255.255.0 HIPER

START HIPER

SYSTEM NETID:
*CPUID NODEID NETID
0A2DE5 ZGESSEA1 RSCS
111111 TCPIP1 TCPIP1

SYSTEM NETID used to point to TCPIP1 machine (TCPIP machine is on the enterprise net)
Production: VM TCPIP stack machine

TCPMAINT 198 Configuration files

system dtcpparms:
:nick.TCPIP :type.SERVER :class.STACK
:ATTACH.BF00-BF02

TCPIP TCPIP:
DEVICE HIPER HIPERS BF00
LINK HIPER QDIOIP HIPER NOFWD MTU 0
HOME
192.168.150.3 255.255.255.0 HIPER
START HIPER

TCPMAINT 198 Configuration files
Service: TCPMAINT: Commands

```
netstat home tcp tcpip1
VM TCP/IP Netstat Level 610       TCP/IP Server Name: TCPIP1

IPv4 Home address entries:
Address     Subnet Mask     Link      VSWITCH
------      -----------      ------    -------
192.168.150.1  255.255.255.0  HIPER     <none>

IPv6 Home address entries: None

set cpuid 111111
Ready; T=0.01/0.01 16:04:35
ping 192.168.150.3
Ping Level 610: Pinging host 192.168.150.3.
Enter #CP EXT to interrupt.
PING: Ping #1 response took 0.023 seconds. Successes so far 1.
Ready; T=0.01/0.01 16:04:40
```

The home address is shown. Changing the CPUID is needed for the ping command to talk with the correct TCPIP1 machine.
Production: VM TCPIP stack machine

```plaintext
netstat home
VM TCP/IP Netstat Level 610       TCP/IP Server Name: TCPIP
IPv4 Home address entries:
Address         Subnet Mask      Link              VSWITCH
-------         -----------      ------            -------
192.168.150.3   255.255.255.0    HIPER             <none>
IPv6 Home address entries: None
```

```
Ready; T=0.01/0.01 16:05:58
ping 192.168.150.3
Ping Level 610: Pinging host 192.168.150.3.
   Enter #CP EXT to interrupt.
PING: Ping #1 response took 0.013 seconds. Successes so far 1.
Ready; T=0.01/0.01 16:06:05
```

No need to set the CPUID – only 1 VM TCPIP machine on production LPAR!
VM TCPIP Server and Clients

- tn3270, ftp, and smtp
This is from the USIGTEL1 virtual machine. It runs an EXEC that asks which LPAR you want to signon to and then will LINK to TCPMAINT user code and run the CMS TELNET EXEC.
This code extract will assign the IP address, then LINK and run the CMS TELNET command.

```
SELECT
  WHEN LPAR = "PRODUCTION 1",
    |  LPAR  = '192.168.150.3' ,
    THEN ip = '192.168.150.3'
  WHEN LPAR = "QA 1",
    |  LPAR  = '192.168.150.4' ,
    THEN ip = '192.168.150.4'

: 'VMLINK TCPMAINT 592 (NONAMES'
  'VMLINK TCPMAINT 198 (NONAMES'
  'CP SET CPUID 111111'
  'TELNET ' ip
```
The other session is on the production side

For example this screen shown earlier is the result of the code from USIGTEL1 – production LPAR chosen and TCPMAINT on production LPAR logged onto.
The LOGOFF

Logoff from TCPMAINT in production will return to USIGTEL1 code. The code will do a LOGOFF of the service zone session.

Press enter or clear key to continue

Session ended. <ENTER> to return to CMS. Telnet terminated -- Connection closed

Press enter or clear key to continue
Using RSCS (Remote Spooling Communication Subsystem) is highly recommended. It is great for sending files from the service zone to the other lpars, z/os, and CECs.

It is also the carrier pigeon for delivering and receiving remote DIRMAINT commands, and the issuance and delivery of CP commands.
RSCS Configuration

RSCS CONFIG:
LOCAL SERVICE * RSCS :
LINKDEFINE ZDONGLA1 TYPE TCPNJE NODE ZDONGLA1 ASTART RETRY
PARM ZDONGLA1 TCPID=TCPIP1 HOST=192.168.150.3

6VMRSC10 401 Configuration Files

PROD
6VMRSC10 401 Configuration Files

RSCS CONFIG:
LOCAL PROD TION * RSCS
LINKDEFINE ZGESSEA1 TYPE TCPNJE NODE ZGESSEA1 ASTART RETRY
PARM ZGESSEA1 TCPID=TCPIP HOST=192.168.150.1
Service zone RSCS Commands

**sm rscs q links name prodtion show parm**

Ready; T=0.01/0.01 15:33:14

Parm Text

TCPID=TCPIP1 HOST=192.168.150.3

1 link found

**sm rscs q links name prodtion**

Ready; T=0.01/0.01 15:33:19

<table>
<thead>
<tr>
<th>Link</th>
<th>Name</th>
<th>Status</th>
<th>Type</th>
<th>Addr</th>
<th>LU Name</th>
<th>Logmode</th>
<th>Queueing</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODTION</td>
<td>connect</td>
<td>TCPNJE</td>
<td>0000</td>
<td>...</td>
<td>...</td>
<td>priority</td>
<td></td>
</tr>
</tbody>
</table>

1 link found

**sm rscs q sy local**

Ready; T=0.01/0.01 16:53:55

RSCS local ID SERVICE .. application ID RSCS
sendfile profile exec to maint at prodtion

File PROFILE EXEC A1 sent to MAINT at PRODTION on 07/24/11 17:01:10

Ready; T=0.01/0.01 17:01:10

From PRODITON: DMTAXM104I File (5511) spooled to MAINT
-- origin SERVICE(MAINT) 07/24/11 17:01:09 EDT

sm rscs q sy local

Ready; T=0.01/0.01 16:53:55

RSCS local ID SERVICE ..
application ID RSCS
Production zone RSCS Commands

```
sm rscs q links name service show parm
Ready; T=0.01/0.01 15:43:17
Parm Text
TCPID=TCPIP HOST=192.168.150.1
1 link found

sm rscs q links name service
Ready; T=0.01/0.01 15:43:23
Link Line
Name Status Type Addr LU Name Logmode Queueing
service connect TCPNJE 0000 ... ... priority
1 link found

sm rscs q sy local
Ready; T=0.01/0.01 16:53:55
RSCS local ID PRODTION ..
application ID RSCS
```
Remote DIRMAINT

Now that all this wonderful infrastructure is in place greatness is yours o masterful DIRMAINT!! The service can manage DIRMAINT on the other LPARs remotely based on the stacked services plus the information in the SYSTEM NETID!
**dirm to prodtion user withpass**

DVHXMT1191I Your USER request has been sent for processing.

Ready; T=0.01/0.02 15:35:00

From PRODTION(DIRMAINT): DVHREQ2288I Your USER request for MAINT at * has been accepted.
From PRODTION(DIRMAINT): DVHREQ2289I Your USER request for MAINT at * has completed; with RC = 0.

RDR FILE 0429 SENT FROM RSCS PUN WAS 5510 RECS 4949 CPY 001 A NOHOLD NOKEEP

DMTAXM104I File (1307) spooled to MAINT -- origin PRODTION(DIRMAINT) 07/24/11 15:35:01 EDT

**USER WITHPASS from the production LPAR sent to the service zone where varied processing is done asked for by the service zone**
Since DIRMAINT commands for adding, changing and deleting minidisks can be done from the service zone it is important for the directories from the other LPARs to be synchronized on the service zone. Otherwise it would be possible for the service zone to clobber space definitions on the other LPARs.

Directory synchronization code is run nightly.
1. 3390 minidisk change made from service zone or directly on the lpar.
2. If the service zone remains unaware of the change, and adds a minidisk it can result in a destructive overlap.
3. Directory synchronization code runs nightly in the service zone:
   a. get the full direct from each LPAR (DIRM TO <lpar> USER WITHPASS
   b. process the <lpar> directory forming a list of all minidisks in a userid:
      ```
      PRODTION NOLOG
      MDISK 0001 3390 39 120 PRDVL1 MR MAINT CF1
      ```
      By using the read password as the name of userid and the write password as the mindisk address a handy reference is available.
   c. Delete the old PRODTION id (DIRM FOR PRODTION PURGE)
   d. Add the new PRODTION id (DIRM ADD PRODTION)
The PRODTION 1 minidisk maps to MAINT's CF1 from the PRODTION LPAR.

A LINKER tool in The SERVICE Links and accesses Any mapped mdisk!

Id defined in service zone

Volume used in PRODTION LPAR but of course visible in the service zone

Remote dirmaint

rscs

tcpip

Telnet, ftp

hipersocket

PRODTION NOLOG MDISK 0001 3390 39 120 PRDVL1 MR MAINT CF1

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PRODTION NOLOG MDISK 0001 3390 39 120 PRDVL1 MR MAINT CF1
Remote commands

Using RSCS as a carrier pigeon commands may be delivered to remote system including cp, cms and Linux commands.

Command client → RSCS → Command server → Remote dirmaint

- Remote commands
  - Telnet, ftp
  - tcpip
  - hipersocket

- Linux, cp, cms commands

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Remote commands

MAINT on service send a Linux command to the production LPAR. The command server on production delivers it to the Linux server.

MAINT: CP MSG DELSERV TO LNXA AT PROD ls
DELSERV: From LNXA at PROD:
DELSERV: /etc /boot /usr /bin /sbin ...

Linux, cp, cms commands
Remote dirmaint
rscs
Telnet, ftp
tcip
hipersocket
Thoughts on the Service Zone LPAR

- Service zone LPAR is a must have for shops with multiple LPARs.
- Vital for effective systems management.
- Remote control of other LPARs.
- It is *not* a sandbox LPAR!
- Define the 2\textsuperscript{nd} level vm systems in the service zone for staging of RSUs and PTFs, virtual sandbox, etc.
- Build new versions of Linux
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