z/VM Process for CPC Upgrade / Replace

These are the high-level steps that have to be executed for z/VM environments when upgrading or replacing a CPC.

1. Gather all the ensemble managed information for the z/VM system that is currently defined.
   a) IEDN & Management Network
   b) GPMP
   c) Storage
   d) Managed Virtual Servers
   e) Processor Management
   f) Workloads
2. Shutdown all managed Virtual Servers.
3. Remove all ensemble managed devices.
4. Un-manage all of the Virtual Servers.
5. Shutdown z/VM.
6. Upgrade / Replace the CPC.
7. Once the system is returned, all the previous definitions that were removed will need to be recreated.
8. Introduction to the python API scripts.

The following are the "detailed" steps needed.

1. Gather information - manual method:

1a. Gather all of the IEDN network information (VSWITCH information, authorized Virtual Servers, Porttype and associated VLAN):

- on z/VM, issue: QUERY VSWITCH IEDNxxx ACC
- for each Virtual Server (VS) in the access list, get the z/VM directory entry and make note of the NICDEF address used for the VSWITCH
  - DIRM FOR virtual_server_name GET NOLOCK

1b. Gather all of the GPMP information (this will display all of the authorized Virtual Servers):

- on z/VM, issue: QUERY VSWITCH SW2 ACC
- for each VS in the access list, get the z/VM directory entry and make note of the

NICDEF address used for the management network

- DIRM FOR virtual_server_name GET NOLOCK

1c. Gather all the storage information:

- On the HMC, get a list of all of the Storage (ECKD) information.
    - Select **Ensemble Management** in the left navigation
    - Select the **Hypervisors** tab in the work area
    - Select the z/VM Hypervisor
- From the **Configuration** task group, open the **Manage Storage Resources** task. Make a note of all the RESOURCES and RESOURCES in a GROUP.
    - Note: you may have to look at the RESOURCE details to get the device and volume serial.

1d. Gather all the Managed Virtual Servers information:

- On the HMC, get a list of all the managed Virtual Servers under z/VM.
    - Select **Ensemble Management** in the left navigation
    - Select the **Hypervisors** tab in the work area
    - Select the z/VM Hypervisor
- From the **Configuration** task group, open the **Choose z/VM Virtual Servers to Manage** task.
    - Click on Show Filter Row icon on the tool bar
    - Click on Filter under the Select column
    - Items drop down, Select Checked Items, Click OK.
    - This will display all of the Virtual Servers that are managed. Make a note of these so they can be re-managed after the upgrade / replace.

1e. Gather all the Processor Management information:

- On the HMC, get a list of all of Virtual Servers that are Processor Management enabled.
    - Select **Ensemble Management** in the left navigation
    - Select the **Virtual Servers** tab in the work area
    - On the icon bar, select the "Configure Columns" icon (a table with a gear over it).
    - Check the **Processor Management** box, Click **OK** (this will add a column to the display).
    - Make a note of all of the Virtual Servers that have this column checked.

1f. Gather all the Workloads information:

- On the HMC, get a list of the Workloads that the Virtual Servers are members of.
    - Select **Ensemble Management** in the left navigation
    - Select the **Virtual Servers** tab in the work area
    - On the icon bar, select the "Configure Columns" icon (a table with a gear over it).
    - Check the **Workload(s)** box, Click **OK** (this will add a column to the display).
    - Make a note of all of the workloads that a Virtual Server is a member of.

---

2. Shutdown all managed Virtual Servers

3. Remove:

- On the HMC, remove Ensemble managed Virtual Server IEDN network adapters.
    - Select **Ensemble Management** in the left navigation
    - Select the **Virtual Servers** tab in the work area
    - Select the z/VM Virtual Server
    - Open the **Virtual Server Details** task
    - Select the **Network** tab,
    - Select the IEDN adapter(s), Click **Remove**.
    - Select the **Options** tab, un-select **Enable GPMP support**.
    - Perform the above steps for each Virtual Server.
    - Note: if using a PROFILE to define these devices (which is tolerated).
        - Remove Host from Virtual Network.
            - Select **Ensemble Management** in the left navigation
            - Select the checkbox next to the ensemble name
            - Click on the double arrow to View popup menu
            - From the **Configuration** task group, open the **Manage Virtual Networks** task.
            - Select the network you want to remove the VS from
            - Click on the **Select Action** drop down menu, **Remove Hosts from Virtual Network**
            - Select the VS, click OK

        - On z/VM, use Dirmaint to remove the NICDEF from the Profile.

        - Virtual Server Details, Options Tab, un-select Enable GPMP support.

- On the HMC, remove the IEDN VSWITCH(s)
    - Select **Ensemble Management** in the left navigation
    - Select the **Hypervisors** tab in the work area
    - Select the z/VM Hypervisor
- From the **Configuration** task group, open the **Manage Virtual Switches** task.
    - Select the IEDN vSwitch, Click on the **Select Action** drop down menu, **Remove vSwitch**, Click **OK**.

- On z/VM, remove the Storage Resources and Groups.
    - Issue DIRM SEND EXTENT CONTROL
    - Remove any volumes from the 3390 group and the respective volumes in the REGIONS section.
    - Save the EXTENT CONTROL file
    - Write out the EXTENT CONTROL file to Dirmaint:
        - Issue DIRM FILE EXTENT CONTROL
        - Issue DIRM RLDE
    - Link the disk with the SYSTEM CONFIG file on it.
        - for z/VM 6.1 this is on MAINT's CF1 disk
        - for z/VM 6.2 it is on PMAINTs CF0 disk
    - Remove all references to any volumes that were in the 3390 group

4. Un-manage all of the Virtual Servers.

- On the HMC, un-manage all the Virtual Servers under z/VM
    - Select **Ensemble Management** in the left navigation
    - Select the **Hypervisors** tab in the work area
- Select the z/VM Hypervisor
    - From the **Configuration** task group, open the **Choose z/VM Virtual Servers to Manage** task.
    - Click on Show Filter Row icon on the tool bar,
    - Click on Filter under the Select column,
    - Items drop down, Select **Checked Items**, Click **OK**.
    - Click on Deselect All icon on the tool bar, Click **OK**.
    - Note: If there are any lingering Ensemble managed devices (for example, direct attached devices), you will receive a panel listing the device and the Virtual Server. These devices will have to be removed from the Virtual Server before it will allow you to un-manage them.

5. Shutdown z/VM

Shutdown z/VM and Deactivate the LPAR.

6. Upgrade/ Replace the CPC

- Upgrade / Replace the CPC (Note: TE/MO process saves the Virtual Networks and Workloads).

7. Manually recreate the z/VM definitions using zManager

- Once the system in returned, all the previous definitions will have to be recreated.
  - IPL z/VM
  - On the HMC:
    - Manage Storage Resource, add back in all of the RESOURCES and add any volumes from the 3390 group back in.
    - Define the IEDN VSWITCH(s).
    - Manage the Virtual Servers.
    - Virtual Server Details, add the IEDN network adapters, Enable GPMP support, Select Workloads and Enable Processor management.

Examples of what the z/VM EXTENT CONTROL files look like.

With the RESOURCES that needed to be removed.

```
:REGIONS.
*RegionId  VolSer    RegStart     RegEnd  Dev-Type  Comments
  VMB411   VMB411          1      65519  3390-64K  * ADDED BY VSMPROXY
  VMB412   VMB412          1      65519  3390-64K  * ADDED BY VSMPROXY
  VMB414   VMB414          1      65519  3390-64K  * ADDED BY VSMPROXY
  VMB413   VMB413          1      65519  3390-64K  * ADDED BY VSMPROXY
:END.
:GROUPS.
*GroupName RegionList
```

3390 VMB411 VMB412 VMB414 VMB413

:END.

:EXCLUDE.

* USERID ADDRESS

:END.

With the RESOURCES removed.

:REGIONS.

*RegionId VolSer RegStart RegEnd Dev-Type Comments

:END.

:GROUPS.

*GroupName RegionList

:END.

:EXCLUDE.

* USERID ADDRESS

:END.

---

8. Introduction to the python API scripts

All of the information gathered in the manual steps above can also be retrieved by utilizing the external interface of the Hardware Management Console (HMC) Web Services Application Programming Interface (Web Services API) for IBM zEnterprise™. For the details of enabling and accessing the API, please refer to Chapter 1. Introduction of the manual System z Hardware Management Console Web Services API Version 2.11.1 (SC27-2616-01).

This set of sample python scripts can be used to perform some of the tasks to migrate 'ensemble-managed' z/VM systems, when doing a CPC Upgrade / Replace.
The scripts invoke the Hardware Management Console Web Services API to perform tasks that would otherwise be done from the HMC GUI panels. The python scripts can be 'batched-up' and invoked via a shell script or batch file.

The HMC IP address in these samples is depicted as xx.xx.xx.xx.

NOTE: The scripts provided in this document are NOT supported by IBM or supplied with any product, but are samples supplied as-is. [1]

`CapturezVMs.py` - Inventories the zVM systems on the ensemble-managed CPC, and produces a report with the information necessary to recreate the zVM ensemble resources following the CPC Upgrade/Replace. CapturezVMs-doc.txt provides documentation for the script

delnic.py - Removes a Virtual IEDN or Physical IEDN interface from a virtual server.

addnic-iedn.py - Adds a Virtual IEDN interface (VSWITCH attached interface) to a virtual server.

addnic-dedicate.py - Adds a Physical IEDN interface using dedicated OSX or IQDX devices, to a virtual server.

gpmp.py - Turns the GPMP option off or on, and, adds the RMC device if turning on the option, for a virtual server.

addvs2wkld.py - Adds a virtual server to a Workload Resource Group.

procmgmt.py – Turns the processor management option off or on for a virual server.

addeckd.py – Adds an ECKD storage resource (a 3390 volume) to a zVM Hypervisor's 3390 storage group.

Running the API scripts

The CapturezVMs.py script takes as input, the IP address of the Ensemble HMC, the CPC name, the HMC userid and password, and, optionally an output file name (default is CapturezVMs.<CPC Name>)

For example:

```
# python CapturezVMs.py xx.xx.xx.xx P95 ensadmin password
```

The output file would then be: `CapturezVMs.P95`

```
For a description of all input parameters, invoke the script with the -h option.
For example:

$ CapturezVMs.py -h
Usage: CapturezVMs.py [options] HMCIP CPCNAME USERID PASSWORD

Options:
  --version             show program's version number and exit
  -h, --help            show this help message and exit
  -v, --verbose         include details and error text in stdout
  -n NAME, --name=NAME  Name of z/VM to capture. Default: all z/VMs
  -p PREFIX, --prefix=PREFIX
                        Virtual server name prefix to capture
  -f FILE, --file=FILE  Output file. Default: script-name.cpc-name
```

To view the input parameters required on the remainder of the scripts, just run the script with no parms, and it will tell you what parameters are required, and give an example:

```
# python addnic-iedn.py
usage:
addnic-iedn.py <ip> <hmc-user> <password> <nodename> <hiper-name> <virtual-
server-name> <devno> <vswitch-name> <osa-type> <port-mode> <
network1-name> <network2-name> <networkn-name>
example:  addnic-iedn.py 9.12.16.241 ensadmin password P93 VML1 GSSF17 1700
IEDN27 osd access zBX_205
  or  :
example:  addnic-iedn.py 9.12.16.241 ensadmin password P93 VML1 GSSF17 1700
IEDN27 osx trunk zBX_205 zBX_206 zBX_227

The script can assign up to 16 networks to an adapter in trunk mode.  An access
mode adapter can be assigned to 1 network
```

Note: If a parameter contains spaces, the parameter must be enclosed in quotes. For example, to add the

Virtual Server GSSP28A to the Workload Resource Group 'zLinux Test', the script addvs2wkld.py can be used with the Workload Resource Group name zLinux Test enclosed in quotes:

```
# python addvs2wkld.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28A "zLinux Test"
```

Using the API scripts for the CPC upgrade / replace

Step 1.

Run the CapturezVMs.py script and verify the ensemble-related zVM data is recorded in the output file, including:
IEDN Virtual Switches, Storage Resources and Groups, Managed Virtual Servers and their ensemble settings: IEDN NICs, GPMP option & RMC device, Workload Resource Group membership, and Processor Management Option.

Step 2.

To prepare zVM to NOT be ensemble-managed, as part of the CPC upgrade / replace procedure, the IEDN NICs defined to every ensemble-managed virtual server must be removed.

The list of ensemble-managed virtual servers and their IEDN NICs are listed in the CapturezVMs.py output. For example:

```
name=GSSP28             gpmp=True   cpu_mgmt=False
                                    workloads= ZLINUX-ZOS
                        vNIC=700    type=osd   interface type=virtual-qdio
                                    port mode=access vswitch=TEN208  vlan ids=1208
                        vNIC=1200   type=rmc
                        vNIC=1700   type=osx   interface type=virtual-iedn
                                    port mode=access vswitch=IEDN206  virtual networks=zBX_206
                        vNIC=1800   type=osd   interface type=virtual-iedn
                                    port mode=access vswitch=IEDN205  virtual networks=zBX_205
                        vNIC=E300   type=iqd   interface type=physical-iqdn
                                    rNIC=E300

name=GSSP29             gpmp=True   cpu_mgmt=False
                                    workloads= ZLINUX-ZOS
                        vNIC=280    type=osx   interface type=physical-iedn
                                    rNIC=28C    virtual networks=zBX_205,zBX_206
                        vNIC=700    type=osd   interface type=virtual-qdio
                                    port mode=access vswitch=TEN208  vlan ids=1208
                        vNIC=1200   type=rmc
                        vNIC=1800   type=osx   interface type=virtual-iedn
                                    port mode=access vswitch=IEDN206  virtual networks=zBX_206
```

Since, to 'unmanage' our zVM virtual servers, we must remove the IEDN NICs, we need to remove the following NICs from GSSP28 and GSSP29:
GSSP28: 1200, 1700, 1800
GSSP29: 280, 1200, 1800.

The NIC at 1200 is the 'RMC', or 'GPMP Network' interface, attached to the SW2 VSWITCH.
That NIC is removed or added by setting the GPMP option off or on for the virtual server - a task which can be done using the gpmp.py script.

The other IEDN NICs can be removed using the delnic.py script. The script can be called multiple times from a shell script (Linux/Unix), or, bat file (Windows), like so:

Linux shell script delnics.py:

```
#!/bin/sh
#############################################################
## used to drive python scripts
#############################################################
python delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1700
python delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1800
```

```
python delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 1800
python delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 280
```

And the shell script can be run like so:

```
# ./delnics.sh 2>&1 | tee delnics.out
```

Windows batch file delnics.bat:

```
cd c:\Python27
python c:\helix\api-scripts\delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1700
python c:\helix\api-scripts\delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1800
python c:\helix\api-scripts\delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 1800
python c:\helix\api-scripts\delnic.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 280
```

And the batch file can be run like so:

```
C:\Python27>c:\hybrid\python\delnics.bat > delnics.bat.ZGM-remove 2>&1
```

To turn off the GPMP option on our z/VM virtual servers, which removes the RMC NIC, a shell script or batch file can be created that calls the gpmp.py python script like so:

```
#!/bin/sh
#############################################################
## used to drive python scripts
#############################################################
python gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 false
python gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 false
```

The script can be run like so:

```
# ./gpmp.sh 2>&1 | tee gpmp-off.out
```

Step 3.

Once the IEDN NICs have been removed from the z/VM Virtual Servers,
the virtual servers can be unmanaged using the Ensemble HMC task: Ensemble Management -> <Ensemble Name> -> Hypervisors ->
<z/VM Hypervisor> -> Configuration -> Choose z/VM Virtual Servers to Manage.

Step 4.

Once the IEDN NICs have been removed from the z/VM Virtual Servers, the IEDN VSWITCHes can then be removed, using the Ensemble HMC task:
Ensemble Management -> <Ensemble Name> -> Hypervisors -> <z/VM Hypervisor> -> Configuration -> Manage Virtual Switches.

Step 5.

On z/VM, remove the Storage Resources and Groups.

- Issue DIRM SEND EXTENT CONTROL
- Remove any volumes from the 3390 group and the respective volumes in the REGIONS section.
- Save the EXTENT CONTROL file
- Write out the EXTENT CONTROL file to Dirmaint:
  - Issue DIRM FILE EXTENT CONTROL
  - Issue DIRM RLDE
- Link the disk with the SYSTEM CONFIG file on it.

- for z/VM 6.1 this is on MAINT's CF1 disk
- for z/VM 6.2 it is on PMAINTs CF0 disk
    - Remove all references to any volumes that were in the 3390 group

Step 6.

Once the z/VM Virtual Servers have been 'unmanaged', the IEDN Virtual Switches have been removed, and the volumes have been removed from the 3390 storage group, the CPC Upgrade / Replace can be done.

Step 7.

Following the CPC Upgrade / Replace, the IEDN Virtual Switches can be re-defined, and the z/VM Virtual Servers re-managed using the Ensemble HMC.

Step 8.

After Re-managing the z/VM Virtual Servers, re-add their ensemble resources and settings using the python API scripts.

For example, create a shell script or batch file that invokes the API scripts to add IEDN NICs, set the GPMP option, add Workload Resource Group membership, and set the Processor Managment option for Virtual Servers like so:

Linux Shell script example (addall.sh):

```
#!/bin/sh
############################################################
## used to drive python scripts
############################################################
python addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1700 IEDN206 osx access zBX_206
python addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1800 IEDN205 osd access zBX_205
python addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28A 1700 IEDN206 osx trunk zBX_205
zBX_206
python addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 1800 IEDN206 osx access zBX_206
python addnic-dedicate.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 280 28c 38 zBX_205 zBX_206
python gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 true 1200
python gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 true 1200
python gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 LOOP1 true 1200
python addvs2wkld.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 ZLINUX-ZOS
python addvs2wkld.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 ZLINUX-ZOS
python procmgmt.py xx.xx.xx.xx ensadmin password P95 VML1 A5653B30 true
python procmgmt.py xx.xx.xx.xx ensadmin password P95 VML1 AUTOONLY true
python procmgmt.py xx.xx.xx.xx ensadmin password P95 VML1 NOLOGUSR true
```

The script can be run like so:

```
[root@litrrac miket]# ./addall.sh 2>&1 | tee addall.out
```

Windows batch file example (addall.bat):

```
cd c:\Python27
python c:\helix\api-scripts\addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1700
IEDN206 osx access zBX_206
python c:\helix\api-scripts\addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 1800
IEDN205 osd access zBX_205
python c:\helix\api-scripts\addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28A 1700
IEDN206 osx trunk zBX_205 zBX_206
python c:\helix\api-scripts\addnic-iedn.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 1800
IEDN206 osx access zBX_206
python c:\helix\api-scripts\addnic-dedicate.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 280 28c
38 zBX_205 zBX_206
python c:\helix\api-scripts\gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 true 1200
python c:\helix\api-scripts\gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 true 1200
python c:\helix\api-scripts\gpmp.py xx.xx.xx.xx ensadmin password P95 VML1 LOOP1 true 1200
python c:\helix\api-scripts\addvs2wkld.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP28 ZLINUX-ZOS
python c:\helix\api-scripts\addvs2wkld.py xx.xx.xx.xx ensadmin password P95 VML1 GSSP29 ZLINUX-ZOS
```

```
python c:\helix\api-scripts\procmgmt.py xx.xx.xx.xx ensadmin password P95 VML1 A5653B30 true
python c:\helix\api-scripts\procmgmt.py xx.xx.xx.xx ensadmin password P95 VML1 AUTOONLY true
python c:\helix\api-scripts\procmgmt.py xx.xx.xx.xx ensadmin password P95 VML1 NOLOGUSR true
```

The batch file can be run like so:

```
C:\Python27>c:\helix\api-scripts\addall.bat > c:\helix\api-scripts\addall.out
2>&1
```

Step 9.

Re-Add Ensemble Storage Resources to the z/VM Hypervisor Storage Groups. The addeckd.py script can be used to do this for ECKD volumes. For example, to Re-add 3390 volume VMB714, with device number b714, and a size of 60,000 cylinders, to the zVM Hypervisor in LPAR VML1, on CPC P93, the script can be run like so:

```
python addeckd.py xx.xx.xx.xx ensadmin password P93 VML1 VMB714 60000 Vol-VMB714 b714
VMB714
```

Note: For the script to run successfully, the volume must not be attached to SYSTEM or any ID.

1 THESE MATERIALS ARE PROVIDED "AS IS" AND, SUBJECT TO ANY STATUTORY WARRANTIES WHICH CAN NOT BE EXCLUDED, IBM MAKES NO WARRANTIES OR CONDITIONS EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, REGARDING THE SCRIPTS. IBM WILL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR RELATING TO ANY USE OR DISTRIBUTION OF THESE SCRIPTS.