LPAR-Tool and NPIV

by PowerCampus [01]

Version 1.5.0.0

LPAR-Tool

- Commandline Tool for Administration of LPARs, VIOS, Managed Systems and HMCs
- simple, fast and efficient in usage
- Management of an arbitrary number of HMCs, Managed Systems, LPARs and Virtual I/O Server
- can be used in scripts or automation tools

Installation of the LPAR-Tool

- Versions for AIX, Linux and MacOS (currently only as a *tar*-file)
- Installation as a package (BFF or RPM) to */opt/pwrcmps/bin*, configuration files under */opt/pwrcmps/etc*.
- Alternativly a *tar*-file is available for all supported Unix derivatives, enabling an installation into an arbitrary directory.
- A license key is required for usage
- The LPAR-Tool can be downloaded from our download page https://powercampus.de .It includes a valid test license for evaluation purposes.
- If you need a license for testing, simply ask by email: info@powercampus.de.
- Documentation is available in english and german in our download area (more than 100 pages).

Usage of the LPAR-Tool

- The LPAR-Tool comes with the 4 commands *hmc*, *ms*, *lpar* and *vios*. These 4 commands offer currently more than 200 functions.
-
```
$ lpar
USAGE:
   lpar [<option> ...] <keyword> [<option> ...] [<argument> ...]
   lpar -V

Recognized keywords:
     activate - Activate AIX, Linux, IBM i or virtual I/O server
partition
     actvnicbkdev - Make virtual NIC backing device active
     addeth - Add virtual ethernet adapter
   ...
```
- For communication with the HMCs SSH is used. In order to prevent the need for a password, we suggest using an SSH-Key together with *ssh-agent*.
- The search path (*$PATH*) should be extended, so that the commands can be found.

Online Help

- The LPAR-Tool has implemented an online help, which provides relevant informations for all supported operations:

```
$ lpar help
Help is available for the following categories:

   lpar help eth fc io led lpm mem memory
   lpar help power proc processor prof profile scsi serial
   lpar help sriov vnic

Specific help is also available for each of the supported keywords:

   lpar help <keyword>

…
```

- Spezific help for a keyword (abbreviated):

```
$ lpar help chmem
Usage:
   lpar [-h <hmc>] … chmem … <attributes>

valid attributes are:
   mem_weight
   mem_expansion
      0 - disable Active Memory Expansion (only in profile possible)
      1.00-10.00 - expansion factor
…
```

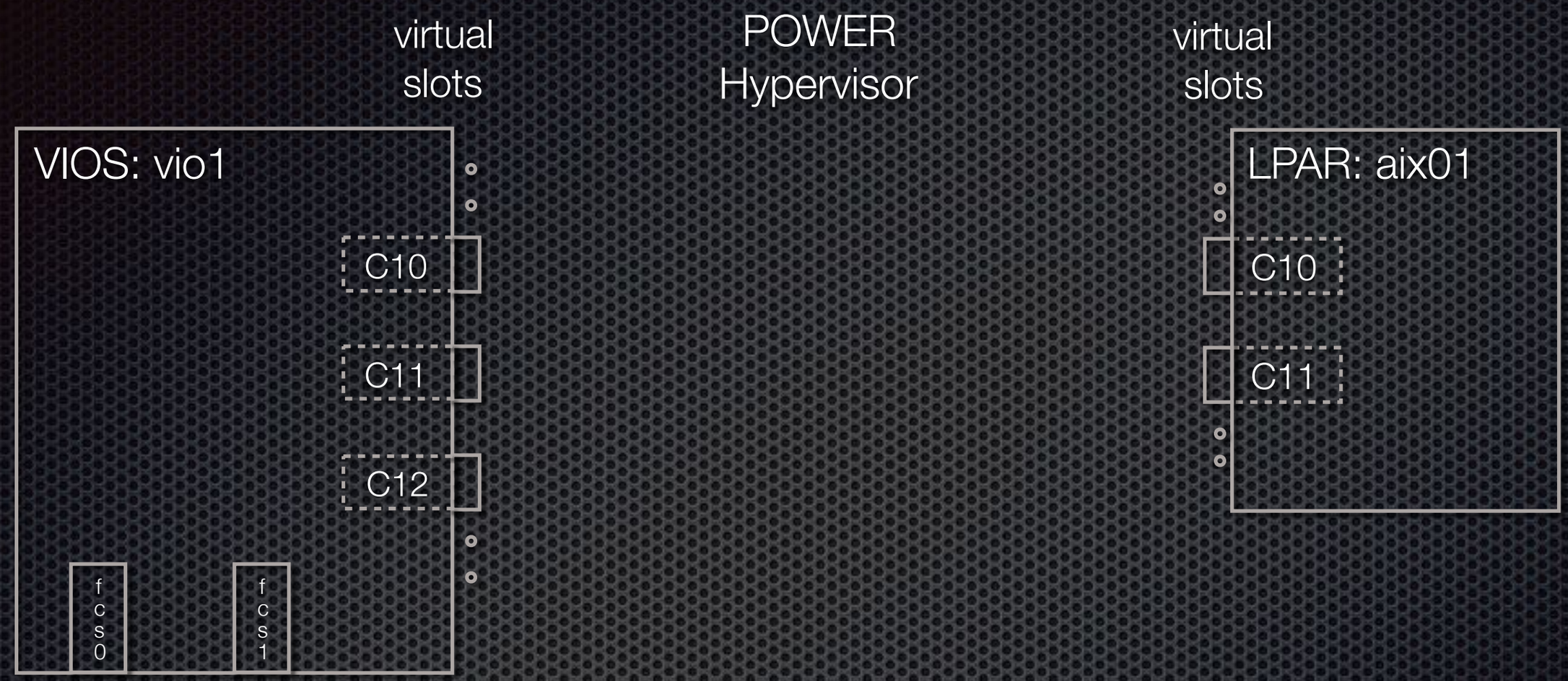
Administration of NPIV with the LPAR-Tool

- Creation of a virtual FC adapter
- Overview of virtual slots
- Displaying NPIV-capable physical FC adapters
- Displaying the current NPIV mappings
- *lpar addfc*
- Client adapter with specific WWPNs
- „*lpar lsvslot*“ or „*lpar lsfc*“?
- Searching for a specific WWPN
- Changing attributes of an adapter
- Removing a virtual FC adapter

Creation of a virtual FC adapter

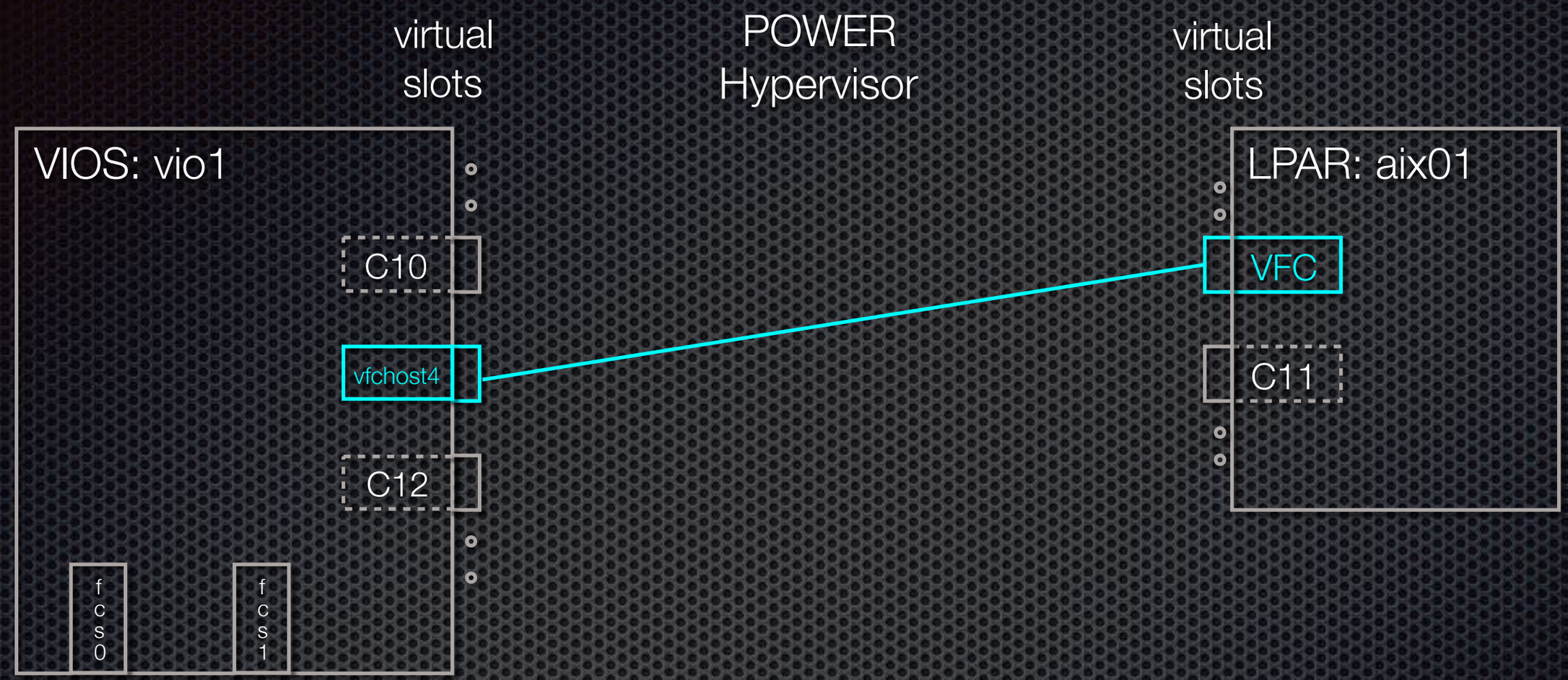
- Creation of virtual FC client and server adapters
- Mapping of the server adapter (*vfchost*) to a physical FC adapter
- Configuration of virtual FC devices in the OS of the client LPAR

Starting Situation



- The virtual I/O server *vio1* owns the physical FC adapters *fcs0* and *fcs1*.
- The virtual slots *C10*, *C11* and *C12* are available on *vio1*.
- The LPAR *aix01* has free virtual slots *C10* and *C11*.

Creation of FC client and server adapters

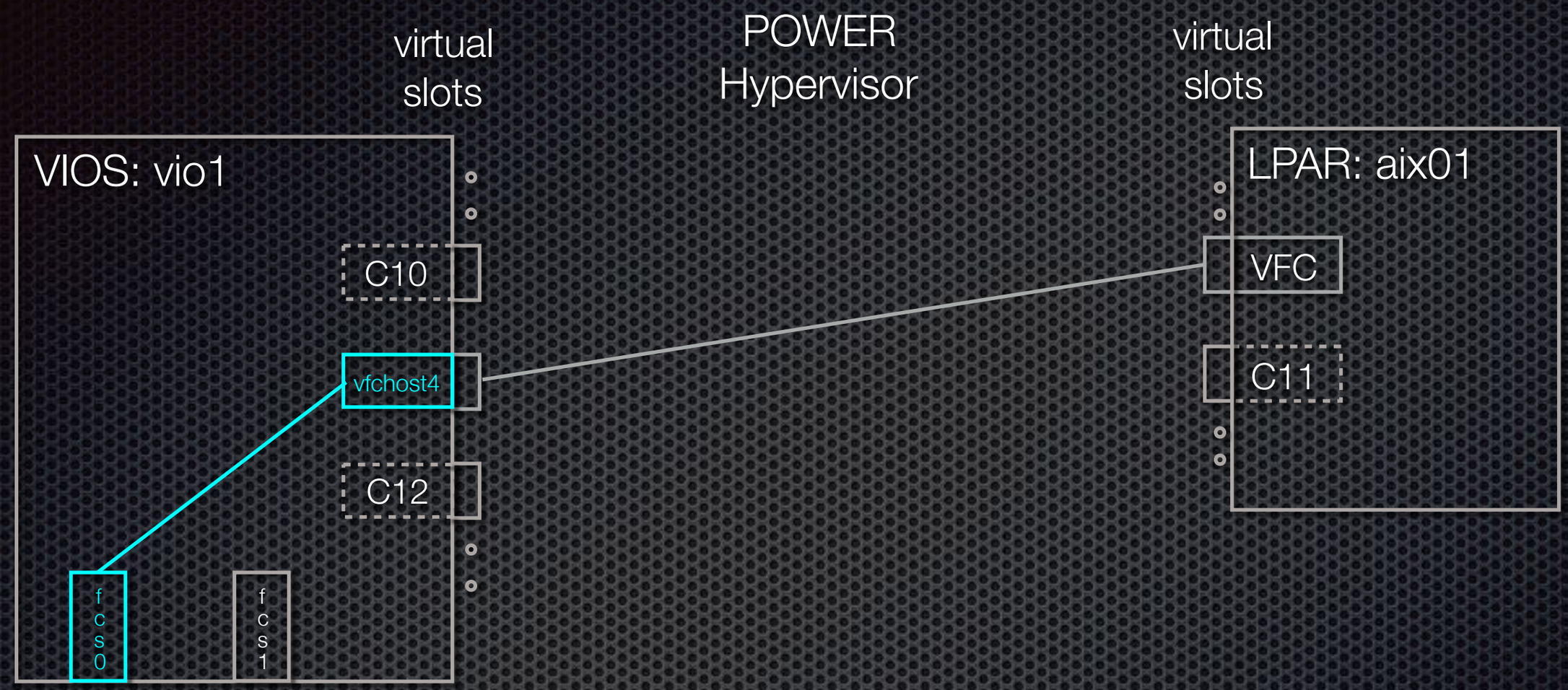


- Using the command „*lpar addfc*“ a virtual FC adapter can be created:

```
$ lpar addfc aix01 10 vio1 11
aix01 slot 10 c050760XXXXX0064,c050760XXXXX0065 -> vio1 slot 11 added by DLPAR operation
aix01 slot 10 c050760XXXXX0064,c050760XXXXX0065 -> vio1 slot 11 added to current profile
(standard)
vio1 slot 11 -> aix01 slot 10 added by DLPAR operation
vio1 slot 11 -> aix01 slot 10 added to current profile (standard)
```

- The command updates the current profile of the LPARs by default.
- The corresponding server adapter (*vfchost*) is automatically created. And the current profile on the virtual I/O server is updated as well.

Mapping of the server adapter to a physical adapter

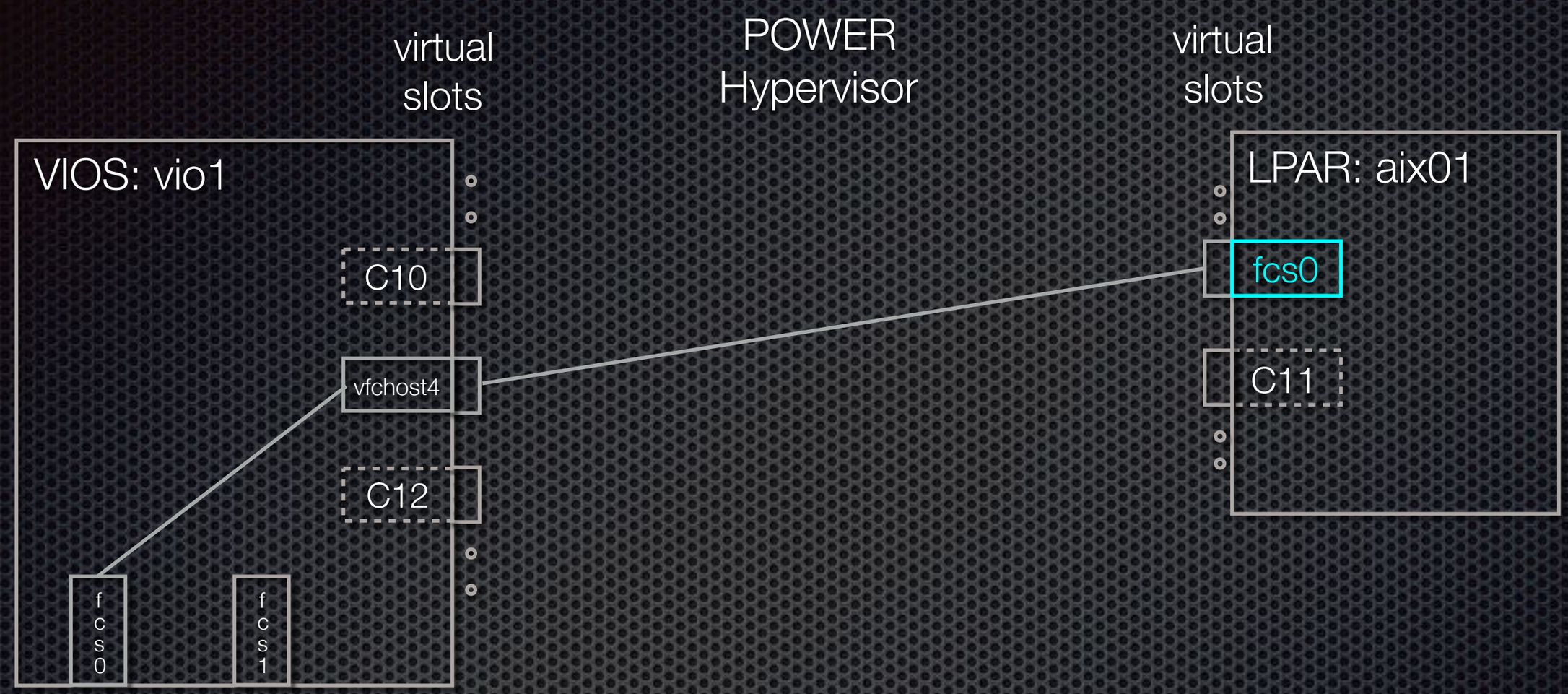


- With the command „*vios vfcmap*“, the server adapter (*vfchost4*) can be mapped to a physical adapter:

```
$ vios vfcmap vio1 vfchost4 fcs0
$
```

- Now the client LPAR can perform I/O to the SAN using the *vfchost* adapter.

Creating the virtual FC devices in the client LPAR

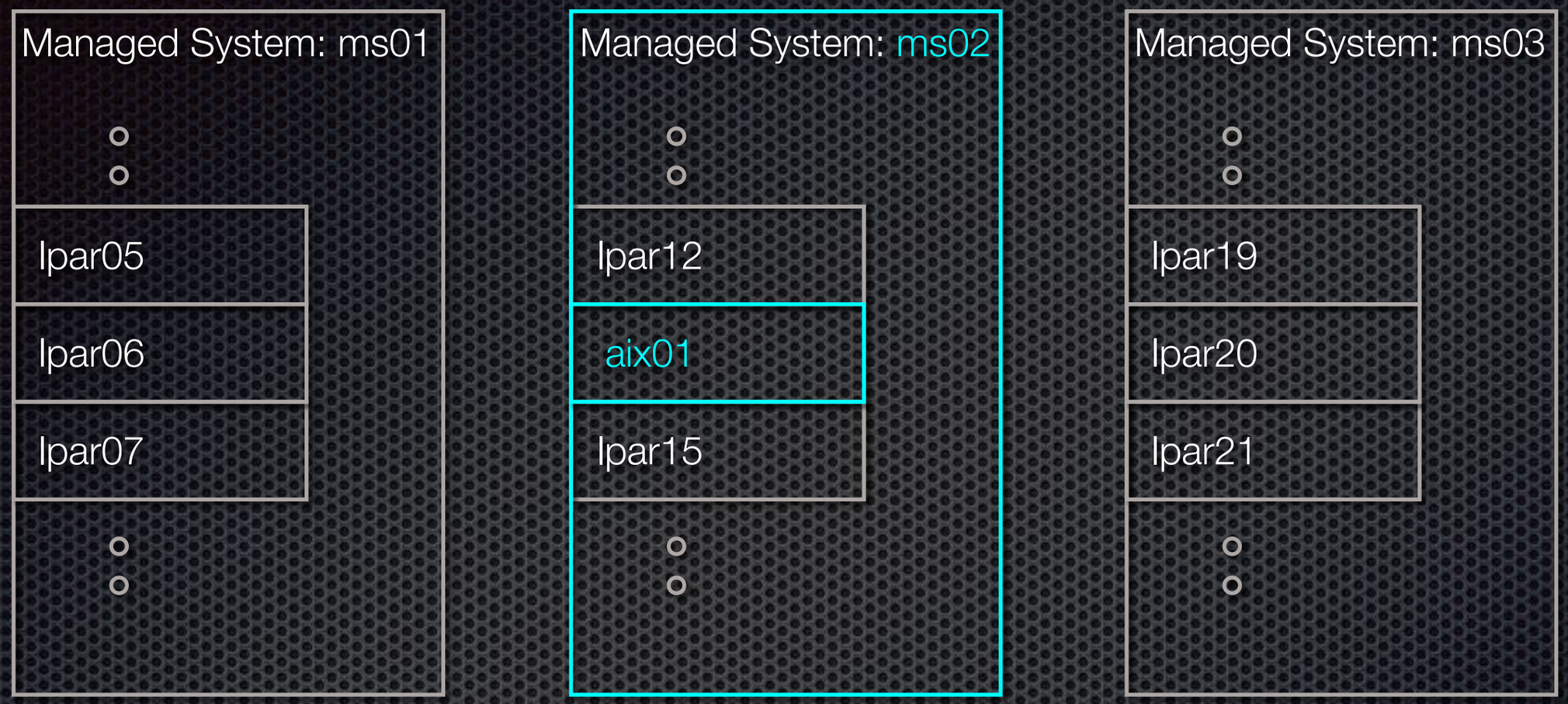


- Finally, virtual FC devices must be created in the kernel of the client, by running the config manager (*cfgmgr*) in the client OS (here AIX is assumed):

```
aix01 # cfgmgr
aix01 # lscg -l fcs*
  fcs0   U9009.22A.XXXXXXX-V5-C10-T1  Virtual Fibre Channel Client Adapter
aix01 #
```

- The virtual FC adapter performs immediately a Login in the connected fabric and can be used immediately by the client.

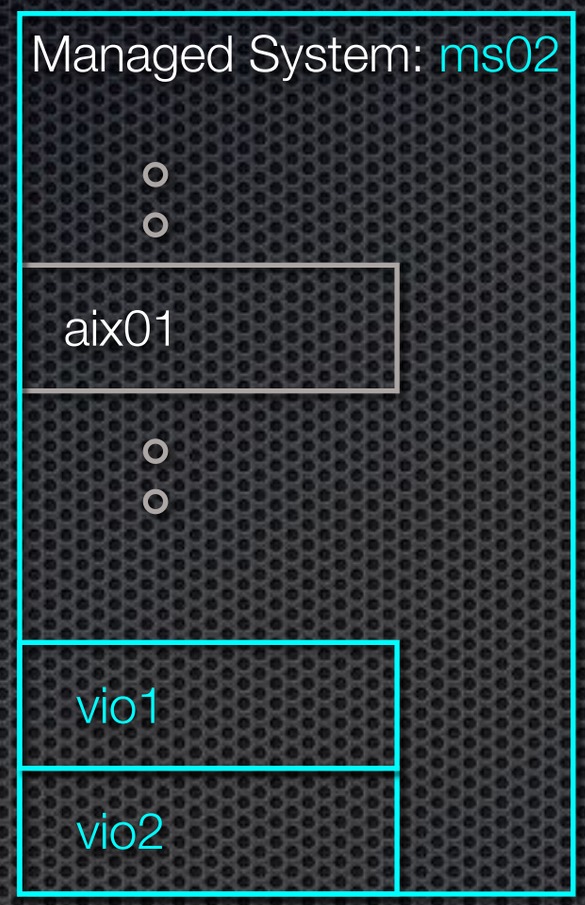
On which Managed System is a specific LPAR?



- The Managed System an LPAR is running on, can easily be determined by using the command „*lpar show*“:

```
$ lpar show aix01
NAME    ID   SERIAL     LPAR_ENV   MS     HMCS
aix01   5    12345605   aixlinux   ms02   hmc01,hmc02
```

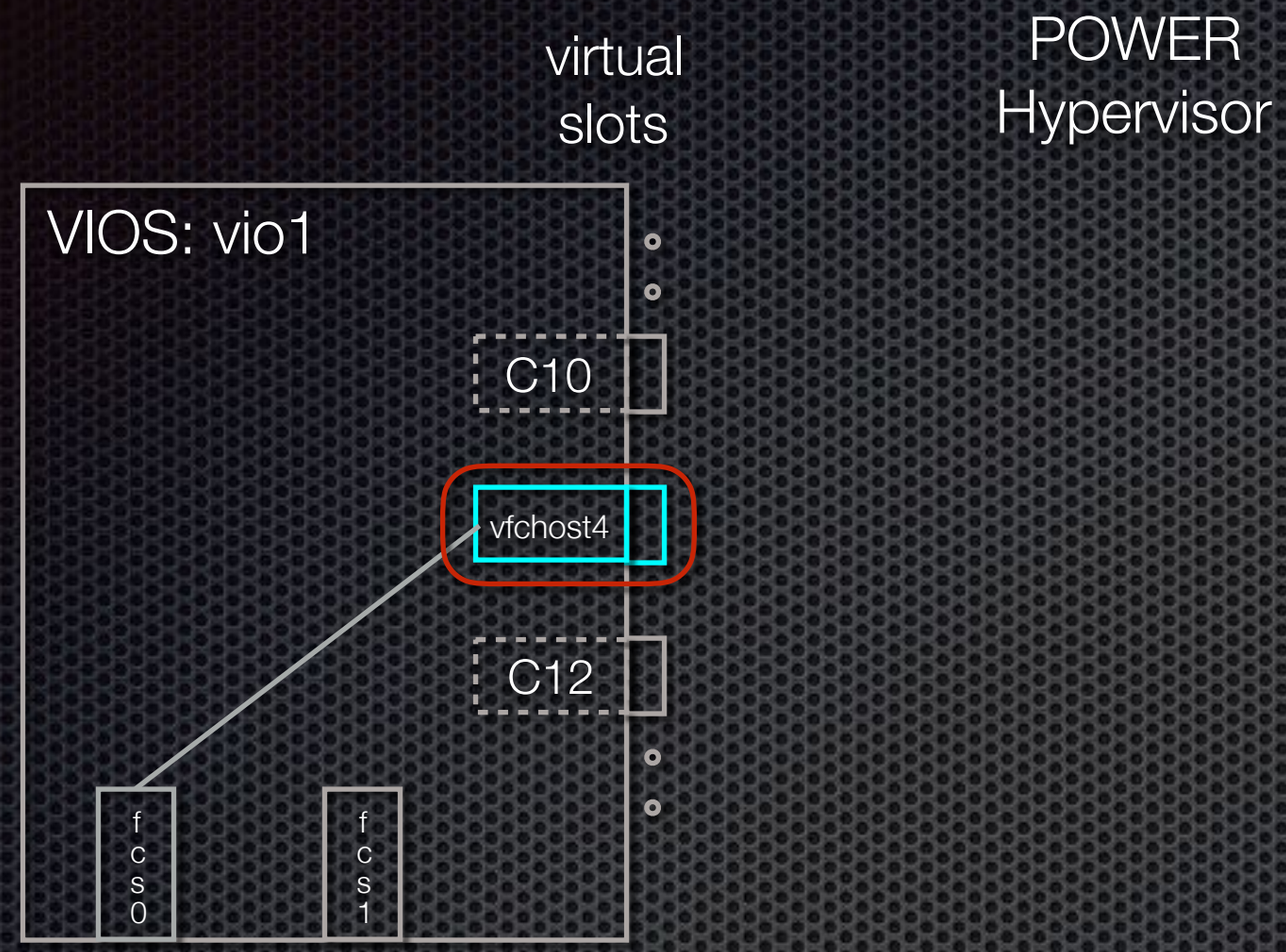
Which Virtual I/O Server are on the Managed System?



- The Virtual I/O Server on a managed system can be determined by „*vios show*“:

```
$ vios -m ms02 show
NAME   ID   SERIAL     LPAR_ENV   MS     HMCS
vio1   1    12345601   vioserver  ms02   hmc01,hmc02
vio2   2    12345602   vioserver  ms02   hmc01,hmc02
```

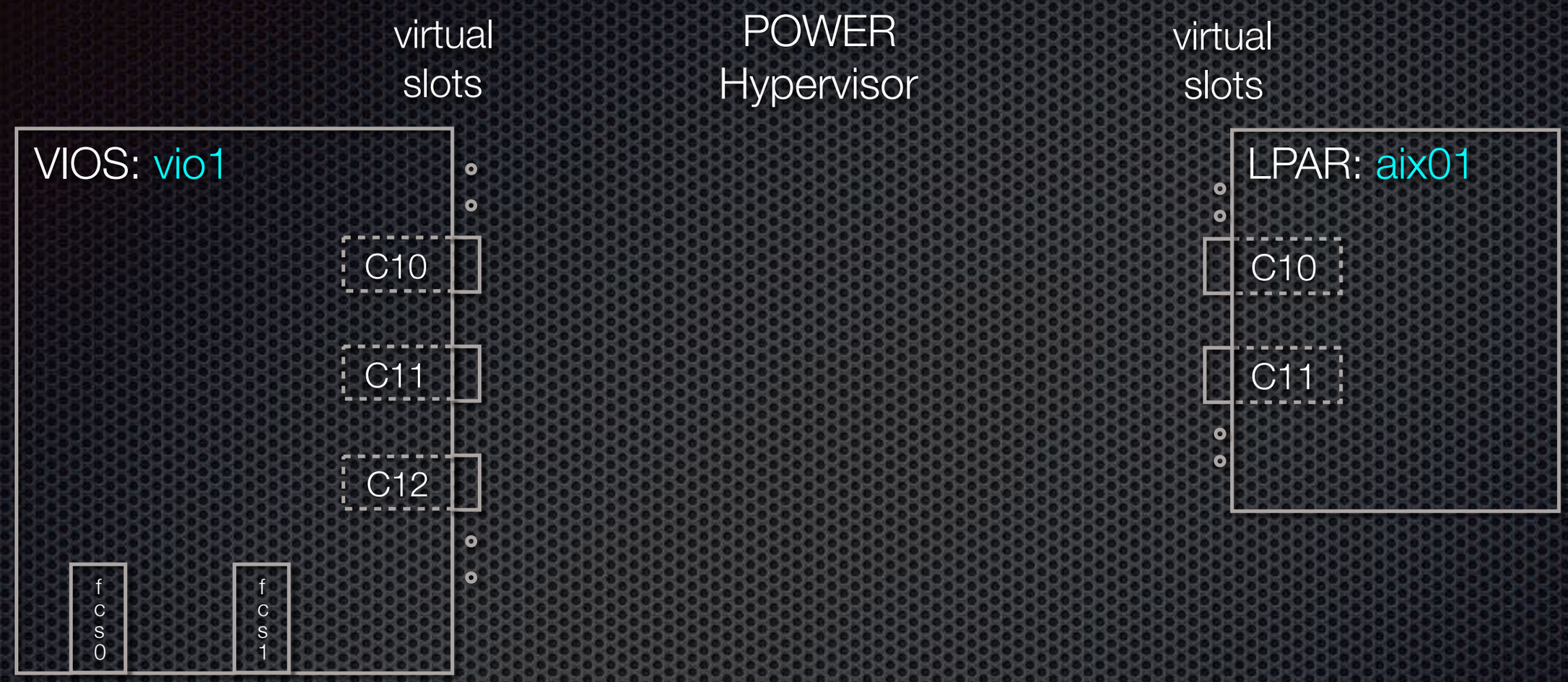
Overview of the virtual slots



- Which type of adapters are used in the virtual slots of an LPAR or a virtual I/O server can be shown by the command „*lpar lsvslot*“:

```
$ lpar lsvslot vio1
SLOT  REQ  ADAPTER_TYPE   STATE  DATA
0     Yes  serial/server  1      remote: (any)/any connect_status=unavailable hmc=1
1     Yes  serial/server  1      remote: (any)/any connect_status=unavailable hmc=1
2     No   eth            1      PVID=1200 VLANS= ETHERNET0 7E1234ABAC02
5     No   eth            1      TRUNK(1) IEEE PVID=1 VLANS=100,200,1200 ETHERNET 7E1234ABAC05
6     No   scsi/server    1      remote: aix01(5)/5
11    No   fc/server      1      remote: aix01(5)/10
$
```

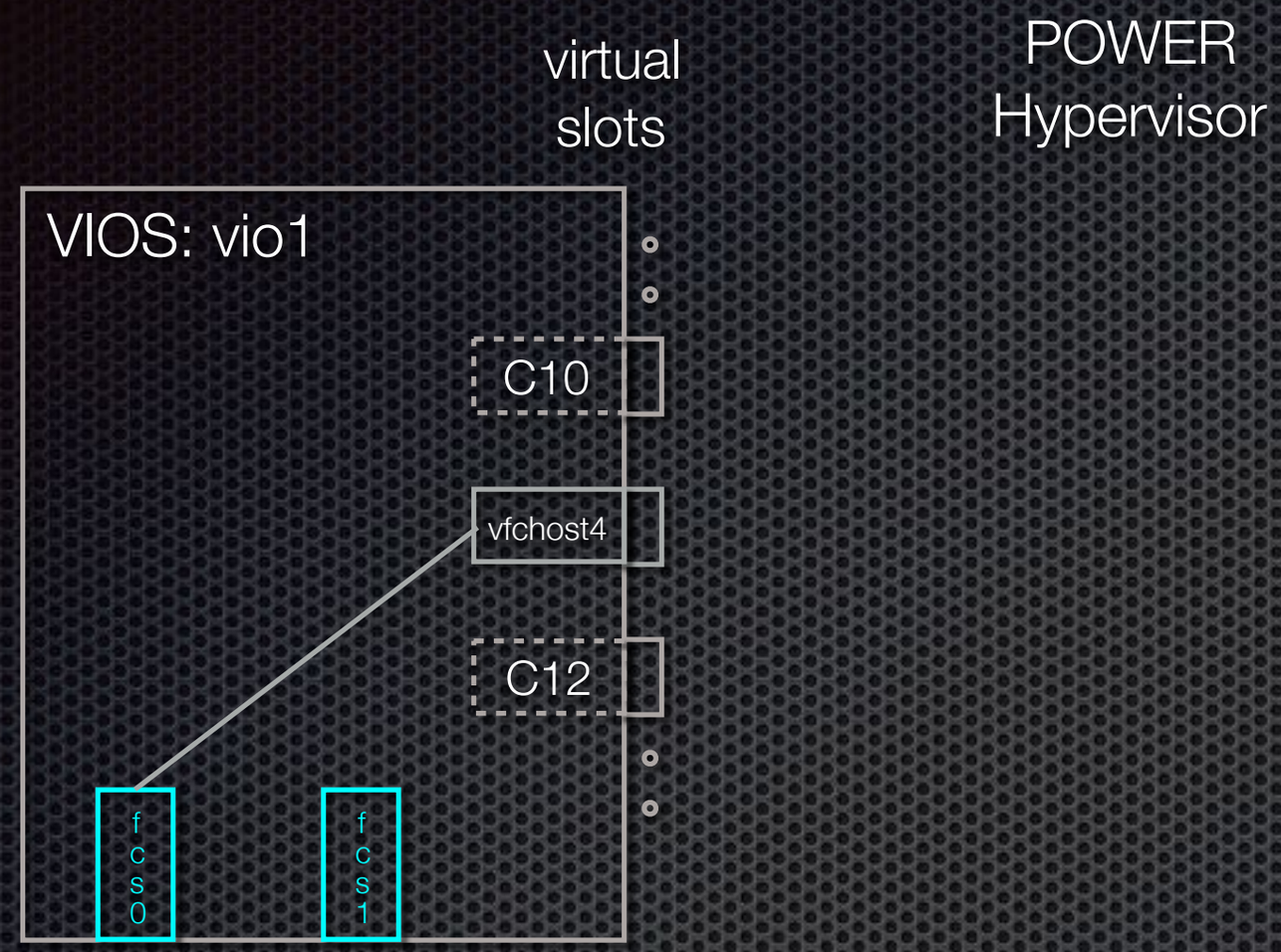
Is there an active RMC connection to the HMC?



- DLPAR-Operations are only possible with an active RMC connection to the HMC.
- The current state of the LPARs (including RMC state) can be shown using „*lpar status*“:

```
$ lpar status aix01 vio1
NAME    LPAR_ID  LPAR_ENV    STATE     PROFILE    SYNC  RMC     PROCS  PROC_UNITS  MEM  OS_VERSION
aix01   5        aixlinux    Running   standard   0     active  1      0.1         4096  AIX 7.1
7100-05-04-1914
vio1    1        vioserver   Running   standard   0     active  5      2.5         8192  VIOS
3.1.0.21
$
```

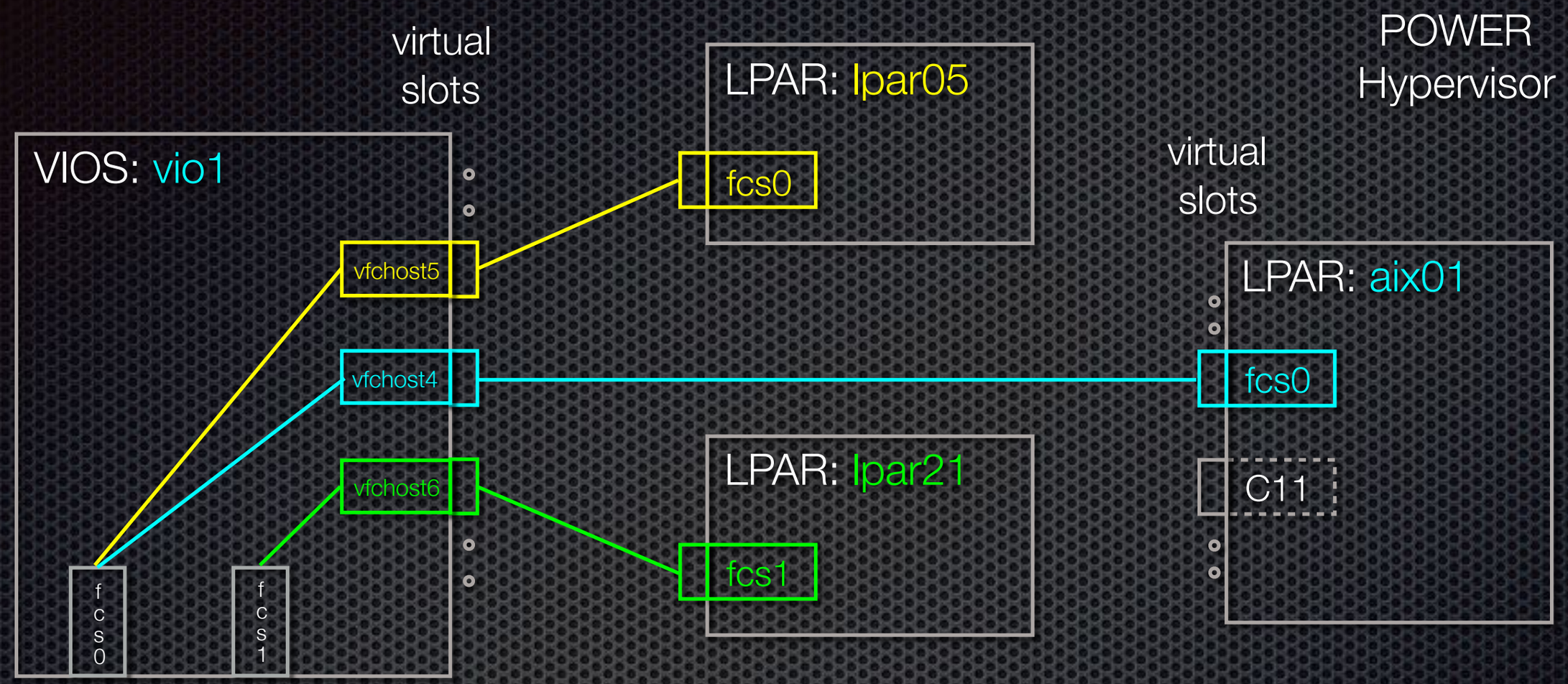
Which NPIV capable FC Adapter are available on a Virtual I/O Server?



- A list of all physical FC adapters which are capable of NPIV, can be shown by „*vios lsnports*“:

```
$ vios lsnports vio1
NAME   PHYSLOC                        FABRIC   TPORTS   APORTS   SWWPNS   AWWPNS
fcs0   U78D3.001.XXXXXXXX-P1-C3-T1   1        64       48       3088     2982
fcs1   U78D3.001.XXXXXXXX-P1-C3-T2   1        64       59       3088     3012
$
```

Which NPIV Mappings exist currently?



- All current NPIV mappings can be displayed using „*vios lsnpiv*“:

```
$ vios lsnpiv vio1
NAME       SLOT  FC    CLIENT       CLNTOS  VFCCLIENT  VFCSLOT  STATUS      PORTS
vfchost4   C11   fcs0  aix01(5)     AIX     fcs0       C10      LOGGED_IN   3
vfchost5   C10   fcs0  lpar05(9)    AIX     fcs0       C5       LOGGED_IN   3
vfchost6   C12   fcs1  lpar21(13)   AIX     fcs1       C10      LOGGED_IN   5
$
```

- The physical FC adapter *fcs0* is used by LPARs *aix01* and *lpar05*.

lpar addfc

- By default, the command „*lpar addfc*“ creates client and server adapter and updates in addition the current profiles of the client LPAR and the virtual I/O server.

- By specififying the option „*-c*“ (client-only), only the client adapter is created:

```
$ lpar addfc -c aix01 10 vio1 11
aix01 slot 10 c050760XXXXX0064,c050760XXXXX0065 -> vio1 slot 11 added by DLPAR operation
aix01 slot 10 c050760XXXXX0064,c050760XXXXX0065 -> vio1 slot 11 added to current profile (standard)
```

- If an LPAR is not active, e.g. because the LPAR has been just created, adapters can be added only to the profil of the LPAR (this can be combined with the option „*-c*“ of course):

```
$ lpar -p profile1 addfc aix01 10 vio1 11
aix01 slot 10 c050760XXXXX0064,c050760XXXXX0065 -> vio1 slot 11 added to current profile (standard)
vio1 slot 11 -> aix01 slot 10 added by DLPAR operation
vio1 slot 11 -> aix01 slot 10 added to current profile (standard)
```

- If a client adapter has to be created temporal only during run-time, then the option „-d“ (dynamic-only) can be used. In that case the client adapter is created by using a DLPAR operation only, the current profil is not updated.

```
$ lpar addfc -d aix01 10 vio1 11
aix01 slot 10 c050760XXXXX0064,c050760XXXXX0065 -> vio1 slot 11 added by DLPAR operation
vio1 slot 11 -> aix01 slot 10 added by DLPAR operation
vio1 slot 11 -> aix01 slot 10 added to current profile (standard)
```

- For convenience reasons the slot numbers can be determined by the LPAR-Tool, by simply not providing slot numbers on the command line. The LPAR-Tool determines available slot numbers:

```
$ lpar addfc aix01 10 vio1
$ lpar addfc aix01 vio1 11
$ lpar addfc aix01 vio1
```

Client-Adapter with given WWPNs

- In rare cases it is possible that a virtual FC adapter must be created using a given specific WWPN. For example, if an LPAR has been deleted by accident and it must be recreated using the original WWPNs.

- The LPAR-Tool offers the possibility to specify the WWPNs simply as an argument with the command „*lpar addfc*“:

```
$ lpar addfc aix01 10 vio1 11 c050760XXXXX0020,c050760XXXXX0021
aix01 slot 10 c050760XXXXX0020,c050760XXXXX0021 -> vio1 slot 11 added by DLPAR operation
aix01 slot 10 c050760XXXXX0020,c050760XXXXX0021 -> vio1 slot 11 added to current profile
(standard)
vio1 slot 11 -> aix01 slot 10 added by DLPAR operation
vio1 slot 11 -> aix01 slot 10 added to current profile (standard)
```

- This works of course together with all other options, like „*-c*“ or „*-d*“ or „*-p*“.

„*lpar lsvslot*“ or „*lpar lsfc*“?

- So far we have always used „lpar lsvslot“ to display the virtual slots of an LPAR:

```
$ lpar lsvslot aix01
SLOT  REQ  ADAPTER_TYPE   STATE  DATA
0     Yes  serial/server  1      remote: (any)/any connect_status=unavailable hmc=1
1     Yes  serial/server  1      remote: (any)/any connect_status=unavailable hmc=1
2     No   eth            1      PVID=1200 VLANS= ETHERNET0 7E1234ABAC05
5     No   scsi/client    1      remote: vio1(1)/5
10    No   fc/client      1      remote: vio1(1)/11 c050760XXXXX0064,c050760XXXXX0065
$
```

- But there is also the command „*lpar lsfc*“ available. The command shows only FC adapters:

```
$ lpar lsfc aix01
LPAR_NAME SLOT REQ TYPE   REMOTE_LPAR_NAME REMOTE_LPAR_ID REMOTE_SLOT_NUM WWPNS
aix01     10   No  client vio1            1              11
c050760XXXXX0064,c050760XXXXX0065
$
```

- In contrast to „*lpar lsvslot*“ the command „*lpar lsfc*“ can be applied to arbitrary many LPARs. If no LPAR is given, then all virtual FC slots of all LPARs shown:

```
$ lpar lsfc
LPAR_NAME SLOT REQ TYPE   REMOTE_LPAR_NAME REMOTE_LPAR_ID REMOTE_SLOT_NUM WWPNS
aix01     10   No  client vio1            1              11
c050760XXXXX0064,c050760XXXXX0065
aix02      5   No  client vio1            1              86
c050760XXXXX0032,c050760XXXXX0033
aix02      6   No  client vio2            2              71
c050760XXXXX0044,c050760XXXXX0045
…
$
```

- If informations about more than one LPAR are needed, then „*lpar lsfc*“ is the better option.

Gezieltes Suchen nach einer bestimmten WWPN

- All display commands of the LPAR-Tool allow to search for specific data records.
- As an example we search for an LPAR with the WWPN *c050760123450012*:

```
$ lpar lsfc -s wwpns~c050760123450012
LPAR_NAME SLOT REQ TYPE   REMOTE_LPAR_NAME REMOTE_LPAR_ID REMOTE_SLOT_NUM WWPNS
aix17     20   No  client vio2             2              137             c050760123450012,c050760123450013
$
```

- The LPAR we searched for is *aix17*. In our environment with more than 500 LPARs the search took approximately 10 sekunds.

Changing Attributes of an Adapter

- A virtual FC adapter has the two attributes *is_required* and *wwpns*. Both attributes can not be changed dynamically. A change is only possible in the profile.

```
$ lpar -p profile01 lsfc aix01
LPAR_NAME SLOT REQ TYPE   REMOTE_LPAR_NAME REMOTE_LPAR_ID REMOTE_SLOT_NUM WWPNS
aix01     10   No  client vio1             1              11
c050760XXXXX0064,c050760XXXXX0065
$
```

- Attributes of FC adapters can be changed using „*lpar chfc*“. E.g. to change the FC adapter in slot 10 to be marked as required in the profile *profile01*:

```
$ lpar -p profile01 chfc aix01 10 is_required=1  # oder
$ lpar -p profile01 chfc -r aix01 10
```

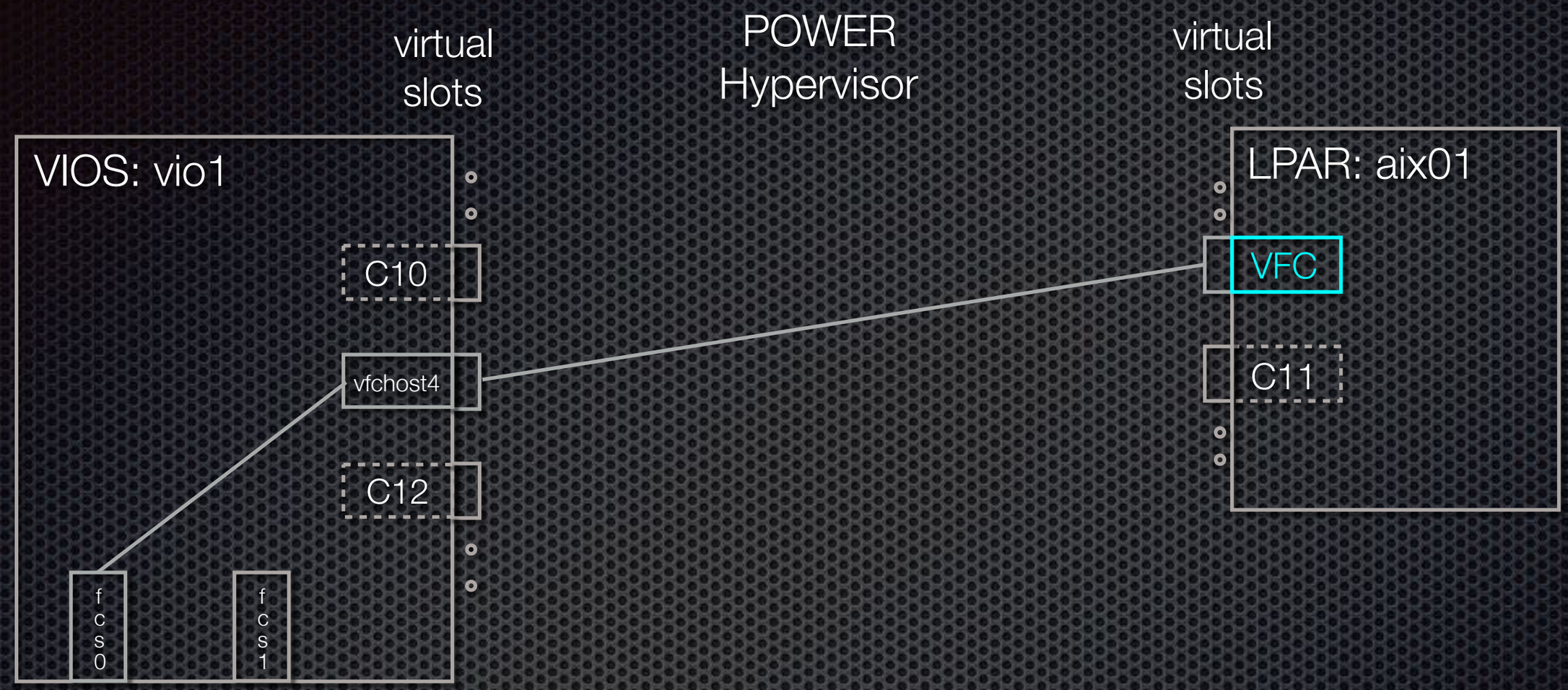
- If attributes are to be changed in the current profile, the profile need not be specified. Attributes which can not be changed dynamically, are simply skipped:

```
$ lpar chfc -R aix01 10 wwpns=c0507601234500 78,c0507601234500 79
is_required skipped from DLPAR operation
wwpns skipped from DLPAR operation
$
```

Overview of the Steps to remove a virtual FC Adapter

- Usage of tapes and disks over the virtual FC adapter to be deleted, must be stopped.
- Removal of the virtual FC adapter and child devices from the OS.
- Removal of the mapping on the virtual I/O server.
- Removal of the virtual FC client and server adapter.

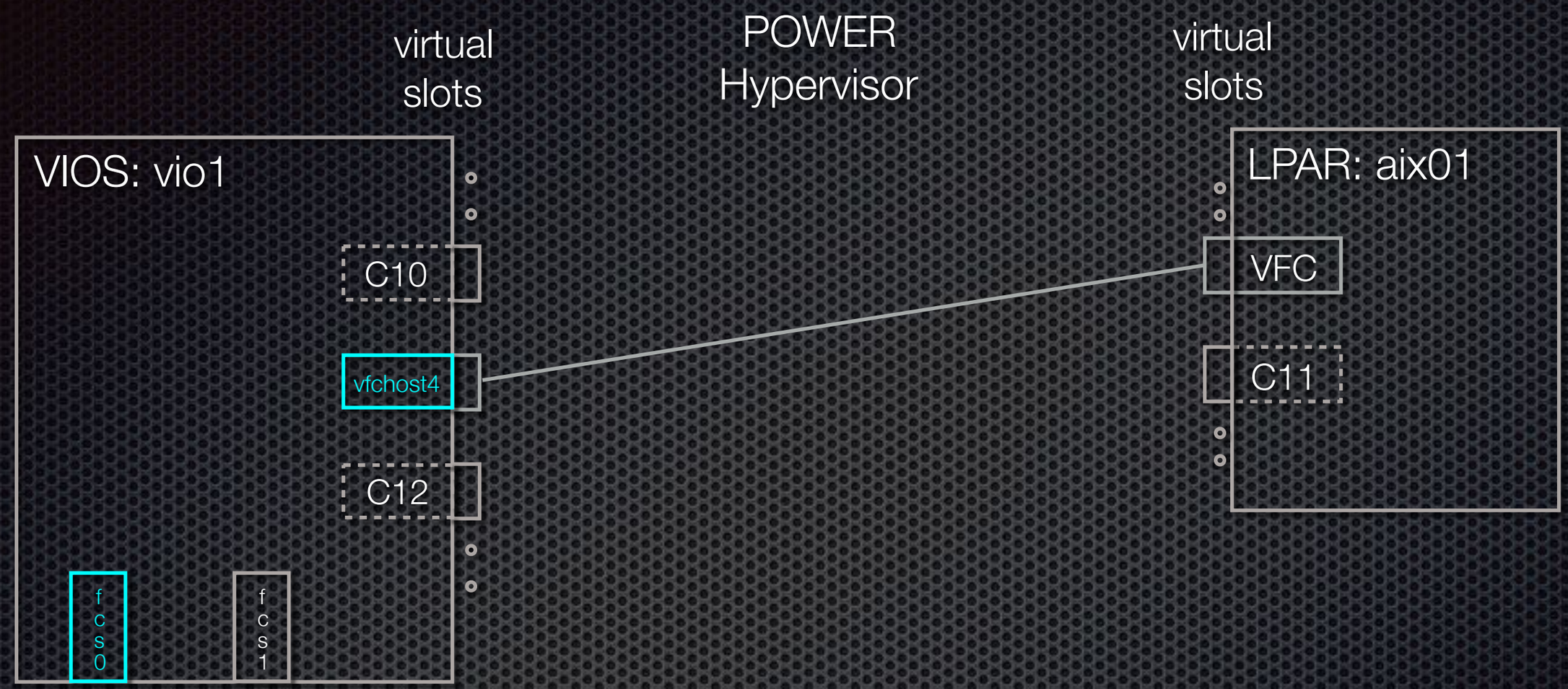
Removal of the FC device in the Client LPAR



- The virtual FC device and its child devices can be removed by „*rmdev -R*“ in the AIX OS:

```
aix01 # rmdev -Rdl fcs0
fscsi0 deleted
fcs0 deleted
aix01 #
```

Removal of the mapping on the virtual I/O server

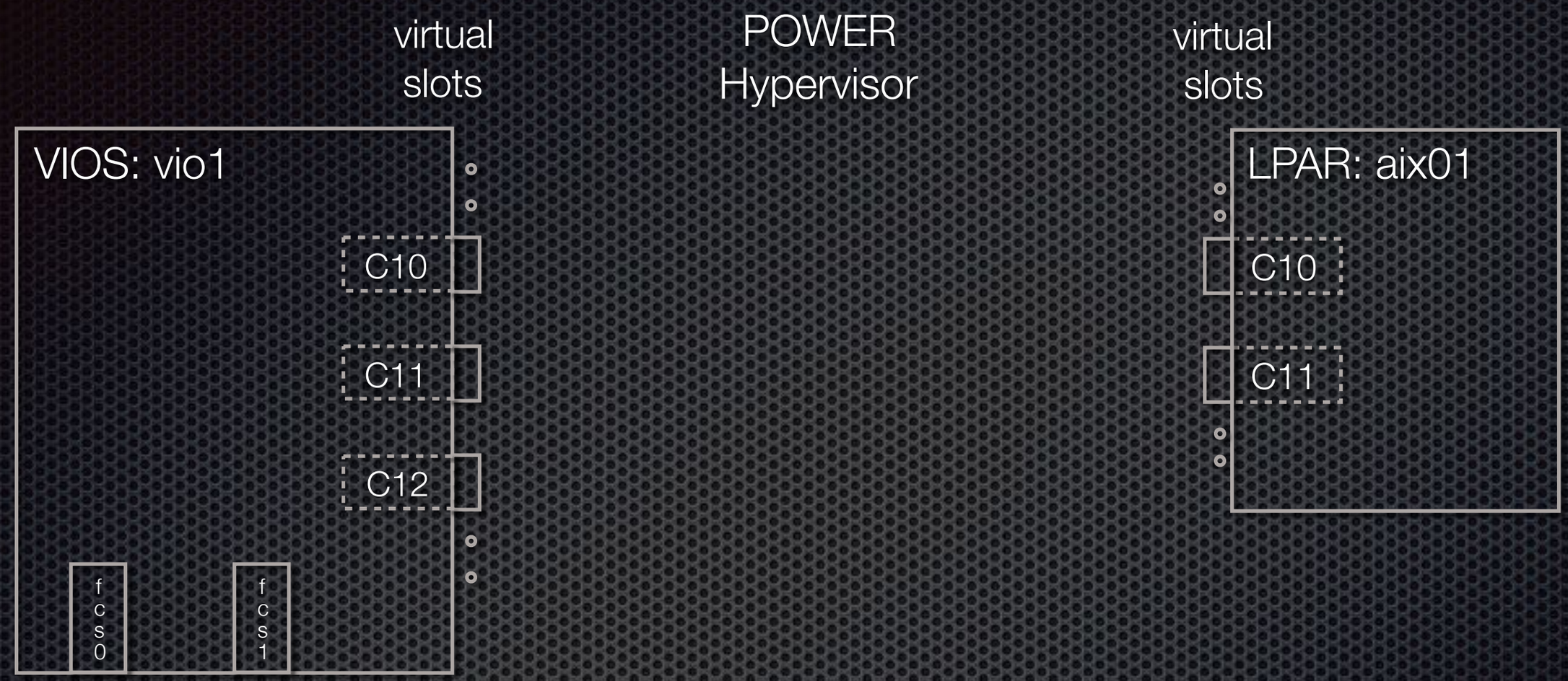


- The mapping of the server adapter (vfchost4) to the physical adapter on the virtual I/O server can be removed by the command „*vios vfcmap*“:

```
$ vios vfcmap vio1 vfchost4
$
```

- I/O by the virtual FC adapter is then no longer possible. There is no longer a connection to the FC fabric.

Removal of the virtual FC Client and Server Adapter



- The virtual FC client adapter can be removed using the command „*lpar rmfc*“:

```
$ lpar rmfc aix01 10
aix01 slot 10 -> vio1 slot 11 removed by DLPAR operation
aix01 slot 10 -> vio1 slot 11 removed from current profile (standard)
vio1 slot 11 -> aix01 slot 10 removed by DLPAR operation
vio1 slot 11 -> aix01 slot 10 removed from current profile (standard)
```

- The command by default removes also the server adapter on the virtual I/O server and updates also the current profiles of th client LPAR and the virtual I/O server.

Overview of the Commands related to NPIV

- List of the commands for FC and NPIV
- lpar addfc - Add virtual FC client adapter
- lpar chfc - Change attributes of virtual FC adapter
- lpar lsfc - List virtual FC adapters
- lpar lsvslot - Show virtual slots
- lpar rmfc - Remove virtual FC client adapter
- ms lsfc - List virtual FC informations
- vios addfc - Add virtual FC server adapter
- vios lsnpiv - Show NPIV mappings
- vios lsnports - List available NPIV-capable ports
- vios rmfc - Remove virtual FC server adapter
- vios vfcmap - Map virtual FC adapter to physical FC port

Any Questions to the LPAR-Tool and PowerCampus 01

- …
- This and other presentations are available for download from our download area.
- If you have questions concerning the LPAR-Tool: *info@powercampus.de*
- Problems can be reported to: *support@powercampus.de*

Thank you for being allowed to
introduce the LPAR-Tool

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