

LPAR-Tool

by PowerCampus⁰¹

PowerCampus⁰¹

- ▶ PowerCampus wants to support everything around POWER virtualization, AIX and PowerHA
- ▶ Offers:
- ▶ [AIX-Talk](#): Videos about different topics (german only)
- ▶ [Software](#): LPAR-Tool, Patch Automaton, Migration Automaton
- ▶ [Consulting](#): On-site support

LPAR-Tool

- ▶ Command line tool for the administration of LPARs
- ▶ easy, fast and efficient in use
- ▶ Administration of any number of HMCs, managed systems and LPARs
- ▶ can be integrated into your own scripts or automation tools

Installation of the LPAR-Tool

- ▶ Versions for AIX, Linux and MacOS
- ▶ Installation as a package (BFF or RPM) to `/opt/pwrcmps/bin`, configuration files under `/opt/pwrcmps/etc`.
- ▶ Alternatively, a *tar* file is available for each derivative, which allows installation in any desired directory.
- ▶ A license key is required. The most current downloadable version has a test license integrated, which is valid for a few weeks.

Using the LPAR-Tool

- ▶ The LPAR tool consists of the 4 commands *hmc*, *ms*, *lpar* and *vios*. These 4 commands currently offer 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

...

- ▶ SSH is used to communicate with the HMCs. The *ssh-agent* and a *SSH-key* should be used in order to prevent prompts for the password.
- ▶ The search path (*\$PATH*) should be adjusted so that the commands are found by default.

Registering HMCs

- ▶ First, the HMCs have to be registered, this is only necessary once per HMC:

```
▶ $ hmc add hmc01
▶ hmc01:
▶   ms01
▶     > aix03
▶     > aix05
▶ ...
▶ $ hmc show
▶ NAME    SERIAL_NUM    TYPE_MODEL
▶ hmc01  123ABC        7042-CR9
```
- ▶ All Managed Systems and LPARs of this HMC will also automatically be registered.
- ▶ If the user account on the HMC is different than on the current system, the HMC user can be specified:

```
▶ $ hmc add hscroot@hmc01
▶ ...
```
- ▶ This makes the LPAR tool ready for use. Of course, more HMCs can be registered later at any time (valid license key required)

Using the LPAR-Tool (1/4)

- ▶ Each of the 4 LPAR commands displays an overview of available functions when called without arguments:

```
▶ $ 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
▶ ...
▶ ...
```

- ▶ All calls to the commands are logged in the *lpar.log* file:

```
▶ $ cat ~/lpar.log
▶ [29.06.19 21:20:56]
▶ Version: 1.4.0 (20190428)
▶ Command: hmc show

▶ [29.06.19 21:22:06]
▶ Version: 1.4.0 (20190428)
▶ Command: lpar status lpar01
▶ hmc01: lssyscfg -m ms01 -r lpar -filter lpar_names=lpar01
▶ hmc01: lshwres -m ms01 -r proc -level lpar -filter lpar_names=lpar01
▶ hmc01: lshwres -m ms01 -r mem -level lpar -filter lpar_names=lpar01
```

Using the LPAR-Tool (2/4)

- ▶ All functions can be called with the option -v ("verbose only"), then the commands that would be started on the HMC are displayed, without actually being executed.
- ▶

```
$ lpar -v -c addfc lpar1 10 ms01-viol 109
hmc01: chhwres -m ms01 -r virtualio -rsubtype fc -o a -p
lpar1 -s 10 -a adapter_type=client,remote_lpar_name=ms01-
viol,remote_slot_num=109
hmc01: lssyscfg -m ms01 -r lpar -filter lpar_names=lpar1
-F curr_profile
hmc01: chsyscfg -m ms01 -r prof -i
lpar_name=lpar1,name=standard,"virtual_fc_adapters+="10/
client//ms01-viol/109//0"""
```
- ▶ HMC or managed system do not usually need to be specified (as long as the names are unique), but are automatically determined by the tool.

Using the LPAR-Tool (3/4)

- ▶ An extensive help system is implemented, which displays all relevant information for an operation:

- ▶ \$ 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>

- ▶ ...

- ▶ Specific help for a keyword (greatly reduced for reasons of space):

- ▶ \$ 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
- ▶ ...

Using the LPAR-Tool (4/4)

- The LPAR tool supports wildcards for specifying LPARs:

```
▶ $ lpar lsmem was*
```

	MEMORY			MEMORY			HUGEPAGES		
NAME	MODE	AME	MIN	CURR	MAX	MIN	CURR	MAX	
was01	der	1.0	2048	4096	8192	0	0	0	
was02	ded	1.0	2048	4096	8192	0	0	0	
...									

- When specifying Managed Systems, the model or serial number can be used in addition to the name:

```
▶ $ ms status 9117
```

MS	STATE	DETAILS	IPADDR	SECONDARY	KEYLOCK
ms04	Operating	None	10.0.0.12	10.0.0.13	norm
ms07	Operating	None	10.0.0.18	10.0.0.19	norm
...					

Some examples

- ▶ Displaying informations
- ▶ User-defined output
- ▶ Console session
- ▶ Starting and stopping of LPARs
- ▶ Creation of new LPARs
- ▶ Creating virtual ethernet adapters
- ▶ Creating virtual SCSI adapters
- ▶ Creating virtual FC adapters
- ▶ HMC user administration
- ▶ HMC resource roles and task roles
- ▶ (New:) Support for storage pools

Displaying informations (1/3)

- ▶ Overview of the installed HMC versions:

```
▶ $ hmc version
▶ HMC          VERSION   SP
▶ hmc01        V8R8.7.0  RELEASE [x86_64]
▶ hmc02        V8R8.4.0  3
```

- ▶ Overview of managed systems memory usage:

```
▶ $ ms lsmem ms01 ms02
▶ MS          INSTALLED    FIRMWARE    CONFIGURABLE  AVAILABLE
▶ ms01        524288       19712       524288       51712
▶ ms02        524288       18432       524288       102144
▶ ...

```

- ▶ Processor usage of managed systems:

```
▶ $ ms lsproc ms01 ms02
▶ MS          INSTALLED    CONFIGURABLE  AVAILABLE
▶ ms01        8.0          8.0          3.45
▶ ms02        8.0          8.0          2.15
```

Displaying informations (2/3)

- ▶ Slot assignment of a managed system:

```
▶ $ ms lsslot ms01
```

DRC_NAME	DRCIDX	IOPOOL	LPAR_NAME	DESCRIPTION
U78AA.001.XXXXXXX-P1-T9 Controller	2101000A	none	ms01-vio1	PCI-E SAS
U78AA.001.XXXXXXX-P1-C7 Ethernet (UTP) 4 Port Adapter	2104000D	none	ms01-vio1	1 Gigabit
PCIE-4x/Short				
U78AA.001.XXXXXXX-P1-C4 Gigabit Fibre Channel Adapter	21010203	none	ms01-vio2	Quad 8
...				

- ▶ Status of all LPARs:

```
▶ $ lpar status
```

NAME	LPAR_ID	LPAR_ENV	STATE	PROFILE	RMC	PROCS	PROCUNITS
MEMORY	OS_VERSION						
lpar1	20	aixlinux	Running	standard	active	2	0.4
4096	AIX 7.1	7100-04-05-1720					
lpar2	16	aixlinux	Running	standard	active	1	0.4
4096	AIX 7.1	7100-04-05-1720					
lpar3	13	aixlinux	Not Activated	-	inactive	0	-
0	Unknown						
...							

Displaying informations (3/3)

- ▶ Mappings of virtual FC adapters on a VIOS:

```
▶ $ vios lsnpiv ms01-viol
   VIOS      ADAPT    NAME     CLIENT    OS      ADAPT    STATUS
PORTS
▶ ms01-viol  fcs4    vfchost1  lpar1    AIX     fcs0
LOGGED_IN  8
▶ ms01-viol  fcs0    vfchost2  lpar3    AIX     fcs0
LOGGED_IN  5
▶ ms01-viol          vfchost4  (19)    unknown  -
NOT_LOGGED_IN 0
▶ ms01-viol  fcs0    vfchost3  lpar4    AIX     fcs1
LOGGED_IN  3
▶ ...
```

User-defined Output

- ▶ Many information-viewing commands also support custom output.
- ▶ With the option, '-f', the available output fields can be displayed (in the stanza format):

```
$ lpar lsproc -f lpar1
lpar1:
  lpar_name=lpar1
  lpar_id=3
  curr_shared_proc_pool_id=0
  curr_shared_proc_pool_name=DefaultPool
...
...
```
- ▶ With the option, '-F' the desired fields can be selected:

```
$ lpar -m 9117 lsproc -F lpar_name:curr_procs:curr_proc_units
lpar_name:curr_procs:curr_proc_units
lpar17:2:0.2
lpar19:1:0.4
...
...
```
- ▶ If you prefer an output in the stanza format, you can simply add the option '-f'.

Console Session

- ▶ A console session can be started anytime as follows:
 - ▶ `$ lpar console lpar1`
 - ▶ Open in progress
 - ▶ Open completed.
 - ▶ IBM IBM
 - ▶ IBM IBM
 - ▶ ...
 - ▶ If the console is already open by another user, a console session can be forced:
 - ▶ `$ lpar console -f lpar1`
 - ▶ Alternatively, the console can be removed without opening a new console:
 - ▶ `$ lpar rmconsole lpar1`

Starting and Stopping of LPARs

- ▶ Activating an LPAR:

```
$ lpar [-p <profile>] activate [-b norm|of|sms] [-c] lpar1
```

- ▶ The current status of an LPAR:

```
$ lpar status lpar1
NAME      ID   TYPE          STATUS    PROFILE      RMC    PROCS  PROCUNITS  MEMORY  OS
lpar1    20  aixlinux     Running  standard  active      2       0.4        4096   AIX
7.1 7100-04-05-1720
```

- ▶ Shutting down an LPAR:

```
$ lpar osshutdown lpar1
```

- ▶ Displaying reference codes (troubleshooting!) of an LPAR:

```
$ lpar lsrefcode -n 5 lpar1
TIME                  REFCODE      WORD2
FRU_CALL_LOC_OUT_CODES
05/29/2018 18:15:17  0811        03D00000  sysplanar0
05/29/2018 18:15:17  0539        03D00000  -
05/29/2018 18:15:13  Starting kernel 03D00000  -
05/29/2018 18:15:12  AIX is starting. 03D00000  -
05/29/2018 18:15:12  CA00E891     03D00000  -
```

Creating a new LPAR

- ▶ In the simplest case, a new LPAR can be created as follows:
 - ▶ `$ lpar -m ms02 create`
 - ▶ `.`
 - ▶ `> lpar1`
- ▶ Here, an LPAR with predefined sizes is created, the LPAR name is *lparN*, the profile name is *standard*. Both can also be specified on the command line:
 - ▶ `$ lpar -m ms02 -p myprofile create mylpar01`
 - ▶ `.`
 - ▶ `> mylpar01`
- ▶ An LPAR created in this way has no physical or virtual adapters (except for the two virtual serial adapters that are always created)

Creating Virtual Ethernet Adapters

- ▶ Check which virtual switches and VLANs exist on the managed system:

```
▶ $ ms lsvswitch ms01
▶ MS      VSWITCH          SWITCH_MODE    VLAN_IDS
▶ ms01   ETHPROD           VEB             720,735,437
▶ ms01   ETHERNET0 (Default) VEB             100,102,105,107
▶ ms01   ETHMGMT           VEB             1400,1600
```

- ▶ Create a virtual ethernet adapter in the profile and via DLPAR operation:

```
▶ $ lpar addeth -s ETHMGMT lpar1 5 1400
```

- ▶ Control the virtual slots:

```
▶ $ lpar lsvslot lpar1
▶ SLOT  REQ   ADAPTER_TYPE  STATE   DATA
▶ ...
▶ 5     no    eth          1       PVID=1400 VLANS= ETHMGMT
▶ ...
```

Creating Virtual SCSI Adapters

- ▶ Creating a virtual client SCSI adapter:
- ▶

```
$ lpar addscsi lpar1 11 ms01-viol 111
```
- ▶ The corresponding *vhost* adapter on the virtual I/O server is automatically created!
- ▶ Slot numbers do not necessarily have to be specified, they can also be determined by the LPAR tool!
- ▶ There are still no disks or LUNs mapped to the new adapter:
- ▶

```
$ vios lsvscsi ms01-viol
VIOS      SLOT   NAME    CLIENT   LUNS
ms01-viol  C35    vhost0  0x04     18
ms01-viol  C80    vhost1  0x05     7
...
ms01-viol  C111   vhost2  0x20     0
```
- ▶ LUNs and LVs can now be assigned:
- ▶

```
$ vios map ms01-viol vhost2 hdisk139 lpar1_hd5
```

Creating Virtual FC Adapters

- ▶ Creating a virtual FC adapter:
▶ `$ lpar addfc lpar1 20 ms01-vio2 209`
- ▶ Create a virtual client FC adapter with default WWPNs:
▶ `$ lpar addfc lpar1 20 ms01-vio2 209
c050760xxxxx0008,c050760xxxxx0009`
- ▶ Again, the corresponding *vfchost* adapter is created automatically on the virtual I/O server!
- ▶ The virtual server FC adapter still has to be assigned to a physical FC adapter:
▶ `$ vios vfcmmap ms01-vio2 vfchost5 fcs1`

HMC User Administration (1/2)

- ▶ Which HMC users are there on an HMC:

```
▶ $ hmc lshmcusr hmc01
```

NAME	DESCRIPTION	TASKROLE	RESOURCEROLE
hscroot	HMC Super User	hmcsuperadmin	ALL:
lpar2rrd	technical user	hmcviewer	ALL:
operator	Operators	firstlevel	ALL:
kmeier	Klaus Meier	hmcsuperadmin	ALL:
...			

- ▶ Create a new user on an HMC:

```
▶ $ hmc mkhmcusr hmc01 testuser
```

```
▶ Enter the new password:
```

```
▶ Retype the new password:
```

- ▶ Delete an account that is no longer needed:

```
▶ $ hmc rmhmcusr hmc01 olduser
```

- ▶ Change attributes of a user:

```
▶ $ hmc chhmcusr hmc01 user01 taskrole=hmcviewer
```

HMC User Administration (2/2)

- ▶ Which users are logged in via CLI:

```
▶ $ hmc lslogon hmc01
▶ USER_NAME   TTY_ID   LOGON_TIME           ACCESS_LOCATION
▶          TASK_NAME  TTY_ID   START_TIME      USER_NAME   PID
▶ kmeier       pts/1    2018-05-29 16:17  10.11.12.13
▶ bash         pts/1    May 29 16:17:25 2018  root        20513
▶ ...
▶ ...
```

- ▶ Which users are logged in via GUI:

```
▶ $ hmc lslogon -r webui hmc01
▶ USER_NAME   SESSION_ID  LOGON_TIME           LOGON_MODE
▶          TASK_ID   TASK_NAME  SESSION_ID  START_TIME      USER_NAME
▶ kmeier       3           04/26/2018 12:54:28 Enhanced+
▶ 156         ms01        3           04/26/2018 12:59:13 kmeier
▶ ...
▶ ...
```

- ▶ Terminate a (hanging) task:

```
▶ $ hmc termtask -r webui hmc01 156
```

HMC Resource Roles and Task Roles (1/2)

- ▶ Resource roles can be used to configure which LPARs and managed systems a user is allowed to administer.

- ▶ Overview of existing resource roles on an HMC:

```
▶ $ hmc lsresourcerole hmc01
▶ NAME      RESOURCES
▶ role2     cec:root/ibmhscS1_0...
▶ ms01only  cec:root/ibmhscS1_0...
```

- ▶ View the resources of a resource role:

```
▶ $ hmc lsresourcerole hmc01 ms01only
▶ name: ms01only
▶ resources:
▶   cec:ms01
▶   lpar:all:ms01
```

- ▶ Add a new resource role:

```
▶ $ hmc mkresourcerole hmc01 role1
```

- ▶ Change a resource role:

```
▶ $ hmc chresourcerole hmc01 role1 +cec:ms02
▶ $ hmc chresourcerole hmc01 role1 +lpar1
▶ $ hmc chresourcerole hmc01 role1 -lpar1
▶ $ hmc chresourcerole hmc01 role1 -cec:ms02
```

HMC Resource Roles and Task Roles (2/2)

- ▶ Task Roles can be used to configure which operations a user may perform.

- ▶ Overview of the existing task roles on an HMC:

```
▶ $ hmc ltaskrole hmc01
▶ NAME          PARENT
▶ hmcsuperadmin Predefined
▶ hmcviewer     Predefined
▶ tr1           hmcoperator
▶ ...
▶ ...
```

- ▶ View the resources of a task role:

```
▶ $ hmc ltaskrole hmc01 hmcviewer
▶ taskrole: hmcviewer
▶ parent: Predefined
▶ resources:
▶   cec
▶     ListCECProperty
▶     ...
▶   lpar
▶     ListLPARProperty
▶     ...
▶   HMCCConsole
▶   ...
```

- ▶ Add a new task role:

```
▶ $ hmc mktaskrole hmc01 limited hmcviewer
```

- ▶ Change a task role:

```
▶ $ hmc chtaskrole hmc01 limited +lpar>ListLPARProperty
▶ $ hmc chtaskrole hmc01 limited +cec>ListCECProperty
▶ $ hmc chtaskrole hmc01 limited -cec>ListCECProperty
▶ $ hmc chtaskrole hmc01 limited -lpar>ListLPARProperty
```

(Neu:) Storage Pools

- ▶ Support for storage pools via the *vios* command:

```
$ vios help sp
...
[-h <hmc>] [-m <ms>] lssp [-v] <vios> [<sp>]
[-h <hmc>] [-m <ms>] mkbdsp [-v] <vios> <sp> <backing-device> <size>
[<vhost> [<vtd>]]
[-h <hmc>] [-m <ms>] rmbdsp [-v] <vios> <sp> <backing-device>
...
```

- ▶ Creating and mapping a backing device:

```
$ vios mkbdsp ms01-viol rootvg back12 512M vhost7
Creating logical volume „back12“ in storage pool „rootvg“.
vtscsi6 Available
back12
```

- ▶ List the backing devices in a storage pool:

```
$ vios lssp ms01-viol rootvg
Name  Size(mb)  VTD      SVSA
back11 1024     vtscsi5  vhost4
back12  512     vtscsi6  vhost7
...
```

- ▶ Support for shared storage pools is planned.

Further Functions

- ▶ There are many more features that could not be presented here
- ▶ Managing system firmware on the HMCs
- ▶ Manage the LEDs of a managed system
- ▶ Create and delete virtual ethernet switches
- ▶ Administration of shared processor pools
- ▶ List the hardware of a managed system, including PS, DIMMs, fans, etc.
- ▶ Administration of the LPAR profiles
- ▶ More DLPAR operations
- ▶ Support of LPM
- ▶ Administration of Virtual Optical Libraries
- ▶ ...

Planned Extensions of the LPAR tool

- ▶ Unterstützung von Firmware Updates und Upgrades
- ▶ Further options for disk mappings with VSCSI
- ▶ Support of SR-IOV (already realized)
- ▶ Support for shared storage pools
- ▶ Support of vNICs (already realized)
- ▶ ...

Advantages of the LPAR-Tool

- ▶ AIX administrators typically work with the shell. With the LPAR tool the complete virtualization can be administrated from the shell. No need to switch to another tool, which saves a lot of time.
- ▶ Working with the LPAR tool is much more efficient than using the HMC GUI!
- ▶ With the LPAR tool various reports can be generated from scratch.
- ▶ The LPAR tool can be easily integrated into your own scripts, the low-level details do not have to be implemented yourself, which can save weeks of work.
- ▶ The LPAR tool comes with support.

Licensing of the LPAR-Tool

- ▶ The licensing is based on the one hand on the serial numbers of the HMCs and on the other hand on the number of LPARs.
- ▶

```
$ lshmc -v
```


▶ ...
▶ *SE 123ABC
▶ ...
- ▶ The license cost per LPAR is staggered depending on the number of LPARs.
- ▶ A test license is already included in the LPAR-Tool, validity usually about 6 weeks from build.
- ▶ Trial licenses for further evaluation are available.

Questions about the LPAR-Tool and PowerCampus 01

- ▶ ...
- ▶ Questions about the LPAR tool at any time:
info@powercampus.de
- ▶ Problems can be reported to: *support@powercampus.de*

Thank you for letting us introduce the
LPAR tool!

PowerCampus⁰¹