

LPAR-Tool

by PowerCampus ⁰¹

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

- 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 ossutdown 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-vio1 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-vio1`
- ▶

VIOS	SLOT	NAME	CLIENT	LUNS
ms01-vio1	C35	vhost0	0x04	18
ms01-vio1	C80	vhost1	0x05	7
...				
ms01-vio1	C111	vhost2	0x20	0
- ▶ LUNs and LVs can now be assigned:
- ▶ `$ vios map ms01-vio1 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 vfcmap ms01-vio2 vfchost5 fcs1`

HMC User Administration (1/2)

- ▶ Which HMC users are there on an HMC:

- ▶ `$ hmc lshmcusr hmc01`

NAME	DESCRIPTION	TASKROLE	RESOURCE ROLE
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 lstaskrole hmc01
NAME          PARENT
hmcsuperadmin Predefined
hmcviewer     Predefined
trl           hmcoperator
...
```

- ▶ View the resources of a task role:

```
$ hmc lstaskrole hmc01 hmcviewer
taskrole: hmcviewer
parent: Predefined
resources:
  cec
    ListCECProperty
  ...
  lpar
    ListLPARProperty
  ...
  HMCConsole
  ...
```

- ▶ 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 Funktionen

- ▶ 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.

Lizenzing 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!

*PowerCampus*⁰¹