

**PowerCampus<sup>01</sup>**  
**LPAR-Tool 1.5.0.x**  
**Getting Started**

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# Foreword

## Introduction

The purpose of this guide is to ease the first use of the LPAR tool. The manual presupposes the following:

- basic knowledge of working on the command line of a UNIX system
- basic understanding of virtualization concepts and features of POWER virtualization

The user manual can be downloaded from the download area on the PowerCampus<sup>01</sup> website:

- <https://www.powercampus.de> or <https://www.powercampus01.com>

## Additional Information

More information about the LPAR tool is available in the Tools section of the PowerCampus<sup>01</sup> website:

- <https://www.powercampus.de> or <https://www.powercampus01.com>

## Help with Problems

If the LPAR tool malfunctions, PowerCampus<sup>01</sup> technical support can be contacted. The following URL will open a software call for the LPAR tool:

- <https://www.powercampus.de/tools/lpar-tool/software-call>

Support can be reached via the following e-mail address:

- E-mail: [support@powercampus.de](mailto:support@powercampus.de)

Software updates of the LPAR tool can be downloaded from the download area on the PowerCampus<sup>01</sup> website:

- <https://www.powercampus.de> or <https://www.powercampus01.com>

# 1. Overview

The purpose of this guide is to help the user get started using the LPAR tool. All steps, from download to installation, setup and first use, are described. This takes only a few minutes. No complicated configuration is necessary!

The LPAR tool was written in C/C++ and translated for the following operating system:

- AIX
- Linux x86

The LPAR tool uses OpenSSH for connection to the HMCs, so a working version of OpenSSH must be installed. A login via OpenSSH to the HMCs must be possible, otherwise the LPAR tool can not work.

The installation of the LPAR tool does not necessarily require administration privileges (*root*), the LPAR tool can also be installed in a home directory.

## 1. Integrated Test License

To test the previous versions, it was necessary to request a so-called trial license, this was very easy by filling out a form on our web page. In version 1.3.0.1 and later, a test license is included so that you can try the software immediately after download and installation without having to request a trial license. The integrated test license has a limited validity of a maximum of 2 months from the build date of the version. On our download page the expiration date of the test license is noted.

The integrated test license supports up to 10 HMCs, up to 100 managed systems and up to 1000 LPARs.

For more extensive testing, it is still possible to request a trial license.

## 2. Downloading the LPAR tool

The LPAR tool can be downloaded from the download section of our website: [www.powercampus.de/download](http://www.powercampus.de/download) or [www.powercampus01.com/download](http://www.powercampus01.com/download).

The LPAR tool is available for AIX as a *bff* package and as a *tar* file:

```
pwremps.lpar.rte.1.5.X.Y.aix.tar  
pwremps.lpar.rte.1.5.X.Y.bff
```

For Linux you can choose between installing an *RPM* package and *tar*-file:

```
pwremps-lpar-rte-1.5.X-Y.x86_64.rpm  
pwremps-lpar-rte-1.5.X-Y.x86_64.tar
```

For MacOS there is currently only a *tar*-file available:

```
pwremps.lpar.rte.1.5.X.Y.mac.tar
```

The *tar* files can be unpacked at any directory.

Download the appropriate version for your operating system and save it on the system where you want to use the LPAR tool.

### 3. Installing the LPAR Tool

Depending on the Unix derivatives, either the *tar* file or the OS-specific package can be installed (except MacOS).

#### 1. Installation of the tar-File

Unpack the *tar* file, e.g. in your home directory.

AIX:

```
$ tar xvf pwrcmps.lpar.rte.1.4.0.1.aix.tar
x Copyright, 108 bytes, 1 tape blocks
x LicenseAgreement, 273 bytes, 1 tape blocks
x hmc, 14065602 bytes, 27472 tape blocks
x ms, 14832670 bytes, 28971 tape blocks
x lpar, 15241792 bytes, 29770 tape blocks
x vios, 9230400 bytes, 18029 tape blocks
x sample.lpar.cfg, 542 bytes, 2 tape blocks
$
```

Linux:

```
$ tar xvf pwrcmps-lpar-rte-1.4.0-1.x86_64.tar
Copyright
LicenseAgreement
hmc
ms
lpar
vios
sample.lpar.cfg
$
```

MacOS:

```
$ tar xvf pwrcmps.lpar.rte.1.4.1.1.mac.tar
x Copyright
x LicenseAgreement
x hmc
x ms
x lpar
x vios
x sample.lpar.cfg
$
```

The *Copyright* and *LicenseAgreement* files contain copyright and license terms. The file *sample.lpar.cfg* contains a sample configuration. In most cases, however, no configuration is necessary. The remaining 4 files *hmc*, *ms*, *lpar* and *vios* represent the 4 commands of the LPAR tool. These can be copied to any directory, preferably one found by the



```
-----  
pwrmps.lpar.rte          1.4.0.1          USR          APPLY          SUCCESS  
#
```

The 4 commands *hmc*, *ms*, *lpar* and *vios* are installed under */opt/pwrmps/bin*:

```
# ls -l /opt/pwrmps/bin  
total 104256  
-rwxr-xr-x  1 root    system    14065602 Sep  2 16:30 hmc  
-rwxr-xr-x  1 root    system    15241792 Sep  2 16:30 lpar  
-rwxr-xr-x  1 root    system    14832670 Sep  2 16:30 ms  
-rwxr-xr-x  1 root    system     9230400 Sep  2 16:30 vios  
#
```

In addition, the files *Copyright*, *LicenseAgreement* and *sample.lpar.cfg* (example configuration file) are installed under */opt/pwrmps/etc*:

```
# ls -l /opt/pwrmps/etc  
total 24  
-rw-r--r--  1 root    system      108 Aug 30 13:27 Copyright  
-rw-r--r--  1 root    system      273 Aug 30 13:27 LicenseAgreement  
-rw-r--r--  1 root    system      542 Aug 30 13:27 sample.lpar.cfg  
#
```

The shell search path (*PATH* variable) should be extended by */opt/pwrmps/bin*.

### 3. Installation of the *RPM*-Package under Linux

The RPM package may be installed with the command *rpm*. This requires administration rights:

```
# rpm -iv pwrmps-lpar-rte-1.4.0-1.x86_64.rpm  
Preparing packages...  
pwrmps-lpar-rte-1.4.0-1.x86_64  
#
```

The 4 commands *hmc*, *ms*, *lpar* and *vios* are installed under */opt/pwrmps/bin*:

```
# ls -l /opt/pwrmps/bin  
total 104256  
-rwxr-xr-x  1 root    system    14065602 Sep  2 16:30 hmc  
-rwxr-xr-x  1 root    system    15241792 Sep  2 16:30 lpar  
-rwxr-xr-x  1 root    system    14832670 Sep  2 16:30 ms  
-rwxr-xr-x  1 root    system     9230400 Sep  2 16:30 vios  
#
```

In addition, the files *Copyright*, *LicenseAgreement* and *sample.lpar.cfg* (example configuration file) are installed under */opt/pwrmps/etc*:

```
# ls -l /opt/pwrmps/etc  
total 24  
-rw-r--r--  1 root    system      108 Aug 30 13:27 Copyright  
-rw-r--r--  1 root    system      273 Aug 30 13:27 LicenseAgreement
```



```
-rw-r--r-- 1 root system 542 Aug 30 13:27 sample.lpar.cfg
#
```

The shell search path (*PATH* variable) should be extended by */opt/pwrcmps/bin*.

## 4. Optional: generate ssh key

If you already have an SSH key or do not want to use an SSH key, you can skip this point.

The LPAR tool executes commands using *ssh* on the HMCs. The following options are then available for authentication:

- Authentication with a password. This requires the interactive specification of the password when using the *LPAR tool*.
- Authentication with a public key without a passphrase. No interactive input of a password or passphrase is necessary when using the *LPAR tool*. (Provided the public key is stored on the HMC accordingly.)
- Authentication with a public key with passphrase. This requires the interactive specification of the passphrase when using the *LPAR tool*. When using the *ssh-agent* (recommended), the passphrase only has to be given to the agent once.

If the *LPAR tool* is used by human users, we recommend using a public key with a passphrase together with the *ssh-agent*. If the *LPAR tool* is to be used by a technical user (automation, scripts, crontab, ...), a public key without a passphrase is recommended.

If you already have an ssh key, you should of course not create a new key! You can then simply use the existing key.

An *ssh* key can be generated with the command *ssh-keygen*:

```
$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/as/.ssh/id_rsa):
Created directory '/home/as/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/as/.ssh/id_rsa.
Your public key has been saved in /home/as/.ssh/id_rsa.pub.
The key fingerprint is:
5d:3f:20:57:e8:74:9d:91:81:b8:d7:a1:09:c3:df:77 as@aixnim
The key's randomart image is:
+--[ RSA 2048 ]-----+
|          . . . o + = |
|          = oo . + . |
|         . oo . = . |
|         . = . B o E |
|        S . . o o |
|                   . |
|                   |
|                   |
|                   |
|                   |
```

```
+-----+
$ ls -l .ssh
total 16
-rw----- 1 as      staff    1766 Mar 17 20:25 id_rsa
-rw-r--r-- 1 as      staff    391  Mar 17 20:25 id_rsa.pub
$
```

A passphrase should be used! The generated public and private key are stored under `~/.ssh`.

## 5. Optional: Storing the public key on the HMCs

If your public key is already stored on the HMCs or you do not want to use public keys, you can skip this point.

In order to be able to log in to the HMCs without a password, the public key must still be stored on the HMCs. The public key (RSA) is in the file `~/.ssh/id_rsa.pub`:

```
$ cat .ssh/id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDAr5vGkQyhvDaDkGZ30hpt4DGiz25c0lPr2Ap/jey5Z0Ql/
6UdSsTidU1svOCBukM+mTM143ZxmRiGBCMn3forFLpvmcm9uQ/
vFzF9hvnukGVLGri6xCnCwB4oahe94+ADZcuzh3VUVindnmIfJ+Oknt+0/
g7iOqlb0TKoZIHHT1rrJAS8AGK7tQ8k1/3AqLJjUX3grJ17hM60W/MIqWRZ8X4KB6SzS6Xfd/
VWc6AKzpgRYxnrFVnuq8GD0wDFXCGaU2zJHyDxe4dQ6vp8pDHmOkyx4dr3WC4XS+7ZWB5/
ZPc34wqru3NySZ8zKERAZJX2PwaTpPsz3uBYMNR21s53 as@aixnim
$
```

To store the public key on the HMCs, you have to log in on each of the HMCs and use the command `mkauthkeys`. Whether you use the user `hscroot`, your own personalized account or another account on the HMC does not matter to the LPAR tool. Log in to the HMCs with the account you are using and store the public key (we have used the `hscroot` account in our example):

```
$ ssh -l hscroot hmc01
hscroot@hmc01's password: XXXXXXXX
Last login: Tue Mar 12 20:13:41 2019 from aixnim
hscroot@hmc01:~> mkauthkeys -a "ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQDAr5vGkQyhvDaDkGZ30hpt4DGiz25c0lPr2Ap/jey5Z0Ql/
6UdSsTidU1svOCBukM+mTM143ZxmRiGBCMn3forFLpvmcm9uQ/
vFzF9hvnukGVLGri6xCnCwB4oahe94+ADZcuzh3VUVindnmIfJ+Oknt+0/
g7iOqlb0TKoZIHHT1rrJAS8AGK7tQ8k1/3AqLJjUX3grJ17hM60W/MIqWRZ8X4KB6SzS6Xfd/
VWc6AKzpgRYxnrFVnuq8GD0wDFXCGaU2zJHyDxe4dQ6vp8pDHmOkyx4dr3WC4XS+7ZWB5/
ZPc34wqru3NySZ8zKERAZJX2PwaTpPsz3uBYMNR21s53 as@aixnim"
hscroot@hmc01:~> exit
exit
Connection to hmc01 closed.
$
```

Check if you can now log in with your public key and passphrase:

```
$ ssh -l hscroot hmc01
Enter passphrase for key ,/home/as/.ssh/id_rsa': XXXXXXXX
Last login: Sun Mar 17 20:50:02 2019 from aixnim
hscroot@hmc01:~> exit
$
```

In order not always having to specify the passphrase, we now start an *ssh* agent and store the passphrase in the *ssh* agent. Then you can log in without a password on the HMCs:

```
$ eval $(ssh-agent)
Agent pid 13828114
$ ssh-add
Enter passphrase for /home/as/.ssh/id_rsa: XXXXXXXX
Identity added: /home/as/.ssh/id_rsa (/home/as/.ssh/id_rsa)
$
$ ssh -l hscroot hmc01
Last login: Sun Mar 17 20:53:49 2019 from aixnim
hscroot@hmc01:~> exit
exit
Connection to hmc01 closed.
$
```

This should be done for all HMCs.

## 6. Optional: Entering a License

If you have not only installed the *LPAR tool* for testing, but have purchased a license to use the *LPAR tool*, you should first install the license you purchased. You should have received a license of the following form:

```
LicenseId: 1
LicenseVersion: 1
LicenseType: prod
HMCs: 1234567,2345678
HMCs: 0123456,3456789
Customer: ACME
HmcCount: 4
LparCount: 450
ExpirationDate: 13.05.2021
LicenseKey: e7f55cd5449494049494afe5bc78233
```

If the *LPAR tool* was installed on AIX or Linux using a package, enter this license information in the file */opt/pwrcmps/etc/lpar.lic* (root rights are required):

```
# cat /opt/pwrcmps/etc/lpar.lic
LicenseId: 1
LicenseVersion: 1
LicenseType: prod
HMCs: 1234567,2345678
HMCs: 0123456,3456789
Customer: ACME
HmcCount: 4
LparCount: 450
ExpirationDate: 13.05.2021
LicenseKey: e7f55cd5449494049494afe5bc78233
#
```

If you use the *LPAR tool* on a Mac with several users, then you should create the directory */opt/pwrcmps/etc* and enter the license there, as stated above:

```
$ sudo mkdir -p /opt/pwrcmps/etc
```

```
Password:
$
```

Alternatively, the license can also be entered in the home directory of each user. To do this, the license must be entered in the home directory of the respective user in the file `~/.lpar.lic`:

```
$ cat ~/.lpar.lic
LicenseId: 1
LicenseVersion: 1
LicenseType: prod
HMCs: 1234567,2345678
HMCs: 0123456,3456789
Customer: ACME
HmcCount: 4
LparCount: 450
ExpirationDate: 13.05.2021
LicenseKey: e7f55cd5449494049494afe5bc78233
$
```

The validity of the license can then be checked immediately:

```
$ lpar -L
LicenseId: 1
LicenseVersion: 1
LicenseType: prod
HMCs: 1234567,2345678
HMCs: 0123456,3456789
Customer: ACME
HmcCount: 4
LparCount: 450
ExpirationDate: 13.05.2021
LicenseKey: e7f55cd5449494049494afe5bc78233
$
```

If the license is not valid, the following error message is displayed:

```
$ lpar -L
ERROR: the license key e7f55cd5449494049494afe5bc78233 is not valid
$
```

It should then be checked whether the license was entered exactly as it was issued. If the license has been entered correctly, but is still displayed as not valid, please contact our support!

## 7. Registering the HMCs with the LPAR tool

For the *LPAR tool* to manage the HMCs, they must be known to the *LPAR tool*.

For this, each HMC that is to be managed by the *LPAR tool* must be registered once with the *LPAR tool*. For this, the command *hmc* with the subcommand *add* is used. The argument to be entered is the HMC to be registered. If a user account other than the local account is used on the HMC, then the account to be used must also be specified.

Example 1: The local account is also used on the HMC.

```
$ hmc add hmc01
hmc01:
  p710
  > aixnim
  > aix03
  > aix02
  > aix01
  > aixvio1
$
```

Example 2: On the HMC the account *hscroot* is used.

```
$ hmc add hscroot@hmc01
hmc01:
  p710
  > aixnim
  > aix03
  > aix02
  > aix01
  > aixvio1
$
```

The found managed systems (here only *p710*) and LPARs (here: *aixnim*, *aix03*, *aix02*, *aix01* and *aixvio1*) are listed.

The *LPAR tool* is ready for use. Additional HMCs can be registered at any time in the same way (provided there is a valid license).

## 8. First commands with the LPAR tool

First, look at the HMCs, managed systems, LPARs, and virtual I/O servers, to see if all expected systems are listed:

```
$ hmc show
NAME    SERIAL_NUM  TYPE_MODEL
hmc01   XXXXXXXX    7042-CR8
$ ms show
MS      SERIAL      MODEL          HMCs    MODEL_NAME
p710   XXXXXXXX    8231-E2B       hmc01   IBM Power 710 Express
$ lpar show
LPAR    ID    SERIAL      LPAR_ENV    MS      HMCs
aix01   2    XXXXXXXX2   aixlinux    p710    hmc01
aix02   3    XXXXXXXX3   aixlinux    p710    hmc01
aix03   4    XXXXXXXX4   aixlinux    p710    hmc01
aixnim  5    XXXXXXXX5   aixlinux    p710    hmc01
aixvio1 1    XXXXXXXX1   vioserver   p710    hmc01
$ vios show
LPAR    ID    SERIAL      LPAR_ENV    MS      HMCs
aixvio1 1    XXXXXXXX1   vioserver   p710    hmc01
$
```

If you start one of the 4 commands *hmc*, *ms*, *lpar* or *vios*, without an argument, a usage message will be displayed:

```
$ hmc
USAGE:
  hmc [<option> ...] <keyword> [<option> ...] [<argument> ...]
  hmc -V
```

Recognized keywords:

```
add [-v] [<user>@]<hmc> ...
chhmcusr [-d <description>] [-v] <hmc> <user> [<attributes> ...]
chresourcerole [-v] <hmc> <resourcerole> {+|-|=}<resource> ...
chtaskrole [-v] <hmc> <taskrole> {+|-|=}<resource> ...
chsvcevent [-o <operation>] [-p <problem_num>] [-v] <hmc>
cmd <hmc> <command> [<argument> ...]
connections [<hmc> ...]
disconnect [<hmc> ...]
list [<hmc> ...]
lshmcusr [-o <format>] [{-f|-j|-y}] [-v] <hmc>
lslogon [-o <format>] [{-f|-j|-y}] [-v] <hmc>
lsnet [{-e [-6]|-n}] [-o <format>] [{-f|-j|-y}] [-v] <hmc>
lsresource [-o <format>] [{-f|-j|-y}] [-v] <hmc>
lsresourcerole [-o <format>] [{-f|-j|-y}] [-v] <hmc> [<resourcerole> ...]
lssvcevents [-a] [-o <format>] [{-f|-j|-y}] [-p <problem_num>] [-t console|hardware] [-v] [<hmc> ...]
lssysconn [-o <format>] [{-f|-j|-y}] [-v] <hmc>
lstaskrole [-o <format>] [{-f|-j|-y}] [-v] <hmc> [<taskrole> ...]
mkhmcusr [-d <description>] [-v] <hmc> <user> [<attributes> ...]
mkresourcerole [-v] <hmc> <resourcerole>
mktaskrole [-v] <hmc> <taskrole> <parent>
remove [-v] <hmc> ...
rescan [-v] [<hmc> ...]
rmhmcusr [-v] <hmc> <user>
rmresourcerole [-v] <hmc> <resourcerole>
rmtaskrole [-v] <hmc> <taskrole>
show [-o <format>] [{-f|-j|-y}] [-F <attributes>] [<hmc> ...]
shutdown [-r] [-v] <hmc> [now|<minutes>]
termtask [-v] <hmc> <session> <task>
version [-o <format>] [{-f|-j|-y}] [-v] [<hmc> ...]
help [{<category>|<keyword>|usage}]
$
```

Each use of the *LPAR tool* is logged in the file `~/lpar.log`:

```
$ cat ~/lpar.log
[17.03.19 20:53:51]
Version: 1.3.0.1 (20190317)
Command: hmc add as@hmc01
as@hmc01: lshmc -n
hmc01: lshmc -v
hmc01: lssyscfg -r sys
hmc01: lssyscfg -r lpar -m p710

[17.03.19 21:02:25]
Version: 1.3.0.1 (20190317)
Command: hmc show

[17.03.19 21:02:27]
Version: 1.3.0.1
Command: ms show

[17.03.19 21:02:29]
Version: 1.3.0.1
Command: lpar show

[17.03.19 21:02:30]
Version: 1.3.0.1
Command: vios show

[17.03.19 21:05:08]
Version: 1.3.0.1 (20190317)
```

```
Command: hmc
$
```

For most subcommands a detailed online help is available, here shown for the subcommand *chhmcusr* of the command *hmc*:

```
$ hmc help chhmcusr
USAGE:
  hmc chhmcusr [-d <description>] [-v] <hmc> <user> [<attributes> ...]

DESCRIPTION:
Changes attributes of the specified HMC user account.

  -d : description for the account, equivalent to the attribute description

valid attributes are:
  name           - the name for the user account
  taskrole       - role with allowed tasks
  resourcerole   - role with accessible resources
  description     - description of the user account
  passwd         - to assign a new password
  pwage          - maximum number of days a password is valid
  min_pwage      - minimum number of days before a password can be changed again
  session_timeout - number of minutes
  idle_timeout   - number of minutes
  remote_webui_access - allow access to HMC Web user interface
    0 : do not allow
    1 : allow
  remote_ssh_access - allow remote login using SSH
    0 : do not allow
    1 : allow
  (for a complete list of attributes consult the IBM documentation)

EXAMPLES:

Change the description for user user01 on HMC hmc03:
  hmc chhmcusr -d 'test user' hmc03 user01 # or
  hmc chhmcusr hmc03 user01 description='test user'

Change the taskrole to hmcsuperadmin for user01:
  hmc chhmcusr hmc03 user01 taskrole=hmcsuperadmin

Disallow remote SSH login for user15:
  hmc chhmcuser hmc03 user15 remote_ssh_access=0

$
```

All commands executed on the HMC commands can be started with the option *,-v* (verbose only). The HMC CLI commands are displayed, but not executed. No changes are made on an HMC. This can be useful if you just want to see what the LPAR tool would do. We briefly show this with two small examples:

Example 1: List the processor configuration of all LPARs

```
-bash-4.4$ lpar -v lsproc
hmc01: lshwres -m p710 -r proc --level lpar --filter lpar_names=aix01
hmc01: lshwres -m p710 -r proc --level lpar --filter lpar_names=aix02
hmc01: lshwres -m p710 -r proc --level lpar --filter lpar_names=aix03
hmc01: lshwres -m p710 -r proc --level lpar --filter lpar_names=aixnim
```

```
hmc01: lshwres -m p710 -r proc --level lpar --filter lpar_names=aixviol
-bash-4.4$
```

Example 2: Add a Virtual Ethernet Adapter (LPAR: *aix01*, Slot: 7, PVID: 100).

```
-bash-4.4$ lpar -v addeth aix01 7 100
hmc01: chhwres -m p710 -r virtualio --rsubtype eth -o a -p aix01 -s 7 -a
port_vlan_id=100,ieee_virtual_eth=0
hmc01: lssyscfg -m p710 -r lpar --filter lpar_names=aix01
-bash-4.4$
```

## 9. Informations for an LPAR

The following shows some commands with which various information about an LPAR can be displayed.

The current status of an LPAR can be shown using "*lpar status*":

```
$ lpar status aix01
NAME      LPAR_ID  LPAR_ENV  STATE      PROFILE  SYNC  RMC      PROCS  PROC_UNITS  MEM
OS_VERSION
aix01     4        aixlinux  Running    standard  0     active   1      0.7         8192  AIX 7.1
7100-05-05-1846
$
```

The LPAR *aix01* currently has 1 processor core with an entitlement of 0.7 and 8 GB of memory. The LPAR is in the "*Running*" state, has an active RMC connection and runs under the AIX 7.1 operating system.

When the LPAR was last stopped or started, the history of the LPAR, can be shown using the "*lpar history*" command (the period is approximately the last 2 months):

```
$ lpar history aix01
TIME                PRIMARY_STATE      DETAILED_STATE
05/08/2020 19:14:45  Started           None
05/08/2020 18:04:18  Stopped           None
05/08/2020 18:03:10  Stopping          None
05/07/2020 11:49:51  Started           None
05/07/2020 11:49:45  Stopped           None
05/07/2020 11:48:36  Stopping          None
05/04/2020 08:00:57  Started           None
05/04/2020 08:00:57  Stopping          None
05/04/2020 07:31:44  Started           None
05/04/2020 07:31:32  Waiting For Input Open Firmware
05/04/2020 07:31:27  Started           None
05/04/2020 07:24:14  Stopped           None
05/04/2020 07:16:02  In Error          Unknown
05/04/2020 06:40:46  Started           None
05/04/2020 06:40:46  Starting          None
05/02/2020 20:20:52  Started           None
05/02/2020 20:20:51  Starting          None
05/02/2020 19:38:05  Started           None
05/02/2020 19:38:05  Starting          None
04/08/2020 11:49:44  Started           None
$
```



Most LPARs are very likely fully virtualized, i.e. all I/O and network adapters are virtual. The command "*lpar lsvslot*" shows which virtual adapters an LPAR is using.:

```
$ 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
5      No   eth           1      PVID=16 VLANS= ETHERNET0 XXXXXXXXXXXXX
10     No   fc/client     1      remote: ms23-vio1(1)/20 c050760XXXXX0002,c050760XXXXX0003
20     No   fc/client     1      remote: ms23-vio2(2)/20 c050760XXXXX0000,c050760XXXXX0001
$
```

The command "*lpar lsprof*" shows which profiles an LPAR has.:

```
$ lpar lsprof aix01
NAME                                MEM_MODE  MEM    PROC_MODE  PROCS  PROC_COMPAT
last*valid*configuration          ded       8192   shared     1      default
standard                           ded       8192   shared     1      default
$
```

There are many other sub-commands of the *lpar* command, the complete list can be obtained by starting the command without arguments. Most of the commands for the output of information allow the specification of more than one LPAR. If no LPAR is given as an argument, the command applies to all LPARs. This enables the status of all LPARs (in our environment there are approximately 500 LPARs distributed over approximately 40 managed systems and 10 HMCs) to be displayed using the simple "*lpar status*" command:

```
$ time lpar status
NAME          LPAR_ID  LPAR_ENV  STATE          PROFILE          SYNC  RMC          PROCS
PROC_UNITS   MEM      OS_VERSION
aixinstall    13       aixlinux  Not Activated  standard         0     inactive    1
0.4          1024    Unknown
aixora01      27       aixlinux  Running        standard         0     active      1
0.1          8192    AIX 7.1 7100-04-01-1543
...
real          0m20.744s
user          0m4.364s
sys           0m4.551s
$
```

The time for the command was measured using *time*, the command only needed 20 seconds to query the status of approximately 500 LPARs on 10 HMCs! For this, about 140 commands were issued on the 10 HMCs. The underlying commands can be displayed with "*lpar -v status*", or simply have a look in the log file *~/lpar.log*.

As a last example, the "*lpar procstat*" command is shown here, which can be used to display the current CPU utilization of an LPAR:

```
$ lpar procstat aix01
SYS_TIME          PROC_MODE  PROCS  PROC_UNITS  PROC_POOL  ENTITLED  PHYSC  IDLE  %ENTC
05/09/2020 15:50:13  shared  1           0.7        DefaultPool  0.70   0.01  0.01  1.11
05/09/2020 15:49:13  shared  1           0.7        DefaultPool  0.70   0.01  0.01  1.10
05/09/2020 15:48:13  shared  1           0.7        DefaultPool  0.70   0.01  0.00  1.10
05/09/2020 15:47:13  shared  1           0.7        DefaultPool  0.70   0.01  0.00  1.07
05/09/2020 15:46:13  shared  1           0.7        DefaultPool  0.70   0.01  0.00  1.02
05/09/2020 15:45:13  shared  1           0.7        DefaultPool  0.70   0.01  0.00  1.08
05/09/2020 15:44:13  shared  1           0.7        DefaultPool  0.70   0.01  0.00  1.05
```

05/09/2020	15:43:13	shared	1	0.7	DefaultPool	0.70	0.01	0.01	1.10
05/09/2020	15:42:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.06
05/09/2020	15:41:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.08
05/09/2020	15:40:13	shared	1	0.7	DefaultPool	0.70	0.01	0.01	1.41
05/09/2020	15:39:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.05
05/09/2020	15:38:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.06
05/09/2020	15:37:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.06
05/09/2020	15:36:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.07
05/09/2020	15:35:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.06
05/09/2020	15:34:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.03
05/09/2020	15:33:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.09
05/09/2020	15:32:13	shared	1	0.7	DefaultPool	0.70	0.01	0.00	1.04

\$

## 10. Starting and Stopping of LPARs

If an LPAR is switched off, it can be activated with the `lpar activate` command. The profile to use, as well as the boot mode, can be specified as arguments to the command:

```
$ lpar activate -p myprofile -b sms aix01
$
```

If you need access to the console of an LPAR, you can do this with the `lpar console` command:

```
$ lpar console aix01

Open in progress

Open Completed.

AIX Version 7
Copyright IBM Corporation, 1982, 2019.
Console login: root
root's Password:
*****
*
*
* Welcome to AIX Version 7.1!
*
*
* Please see the README file in /usr/lpp/bos for information pertinent to
* this release of the AIX Operating System.
*
*
*****
Last login: Fri May 8 20:09:19 2020 on /dev/vty0

#
```

A console session can be terminated by pressing `ESC-~`.

If you want to shutdown an LPAR and you don't want to log in to the LPAR, you can use the "*lpar ossshutdown*" command. It performs a regular shutdown of the operating system, in the case of AIX the *shutdown* command is executed in the LPAR:

```
$ lpar ossshutdown aix01  
$
```

## **11. Further Commands with the LPAR Tool**

Further commands and a detailed description of how to use the *LPAR tool* can be found in the user manual.