



ASMLib rechecked

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In this article the features and added value of Oracle ASMLib is re-checked. The target audience are consultants, DBAs, Sysadmins. The reader should have a basic knowledge of Oracle Grid Infrastructure, Oracle ASM and Linux. Neither ASM itself nor performance aspects will be discussed here.

1. Introduction

Oracle ASMLib is an optional software component that can be used in configurations utilizing Oracle ASM on Linux. Its main purpose is the persistent device naming.

2. Background Information

2.1 Purpose of Oracle ASMLib

First, a quote from Oracle: "ASMLib allows an Oracle Database using ASM more efficient and capable access to the disk groups it is using"

The main features of Oracle ASMLib are:

- Persistent Device Naming
 - Linux does not guarantee persistent device naming w/o further mechanisms
 - Note: ASM would be able to find its disks by scanning the device header, so a changed device name wouldn't be a problem. But you would still have to configure the correct ownership and permissions for the device file for ASM to be able to work with this device
- Correct ownership and permissions for the ASM devices
- Before Oracle 10gR2 the limited number of raw devices supported by the kernel could become a problem (Kernel 2.4: 256 devices, Kernel 2.6: 8192 devices); but starting with 10gR2 Oracle ASM is able to use block devices directly (w/o raw emulation)
- With ASMLib the disks are correctly released after having dropped a disk group (with block devices you must clean them (with dd))

Just a short note: Oracle Exadata systems do not use ASMLib.



2.2 Release history of Oracle ASMLib Kernel driver

<u>Date</u>	<u>Version</u>	<u>ASM Release</u>
10.02.2004	ASMLib 1.0.0	ASM 10gR1
27.01.2005	ASMLib 1.0.3	
30.04.2005	ASMLib 1.0.4 and 2.0.0	ASM 10gR2
18.11.2005	ASMLib 2.0.1	
31.05.2006	ASMLib 2.0.2	
16.07.2007	ASMLib 2.0.4	ASM 11gR1
05.11.2008	ASMLib 2.0.5	

Version 1.0.x is for Linux Kernel 2.4.xx, Version 2.0.x is for Linux Kernel 2.6.xx.

2.3 Availability of Oracle ASMLib

Oracle ASMLib is only available for Linux; as a kernel module is needed only the supported Linux distributions will work!

Oracle ASMLib is available for the following Linux distributions

- Oracle Linux / Oracle Enterprise Linux
 - Oracle Linux / Oracle Enterprise Linux 5
 - Oracle Enterprise Linux 4
 - Oracle Enterprise Linux 3
- Red Hat Enterprise Linux
 - Red Hat Enterprise Linux 5
 - Red Hat Enterprise Linux 4
 - Red Hat Enterprise Linux 3
 - Red Hat Advanced Server 2.1
- Suse Linux Enterprise Server
 - SuSE Linux Enterprise Server 11
 - SuSE Linux Enterprise Server 10
 - SuSE Linux Enterprise Server 9
 - SuSE Linux Enterprise Server 8 SP3

The required RPM packages are downloadable from OTN (free access) or via the ULN (valid support contract needed):

- <http://www.oracle.com/technetwork/server-storage/linux/downloads/index-088143.html>
- <http://www.oracle.com/technetwork/server-storage/linux/uln-095759.html>



3. Installation and configuration

3.1 Overview about installation and configuration on Oracle Linux 5.6

First we have to install the needed rpms (here the latest versions for RHEL 5)

- oracleasm-support-2.1.7-1.el5.x86_64.rpm
 - Utilities used to get the ASM driver up and running
- oracleasm-lib-2.0.4-1.el5.x86_64.rpm
 - Actual ASM library
- oracleasm-2.6.18-274.el5-2.0.5-1.el5.x86_64.rpm
 - Kernel driver for the ASM library

Note: When using the "Unbreakable Enterprise Kernel" from Oracle, the kernel driver is already included in the Kernel.

The configuration requires the disks already being available on the operating system layer and being partitioned. ASMLib itself is not able to handle multiple pathes to a storage device so multipathing has to be configured separately (Device Mapper Multipath, Powerpath etc). ASMLib can work with the Multipath devices, but requires a partition on the device; multipath access to the partition has to be configured with the command kpartx.

Overview over some important commands:

- /usr/sbin/oracleasm configure -i
 - Initial configuration of ASMLib
- /usr/sbin/oracleasm createdisk <LABEL> <device>
 - Creation (labeling) of an ASMLib disk
- /usr/sbin/oracleasm listdisks
 - Lists the configured ASMLib disks
- /usr/sbin/oracleasm scandisks
 - Scans the system for already created ASMLib disks; mainly used in RAC
- /usr/sbin/oracleasm update-driver
 - Available since vers. 2.1 of oracleasm-support
 - Searches for an updated version of the driver

3.2 Installation of the rpm packages:

The three RPM packages are installed with the standard rpm command:

```
# rpm -Uvh oracleasm-support-2.1.7-1.el5.x86_64.rpm
Preparing... ##### [100%]
 1:oracleasm-support ##### [100%]
```

```
# rpm -Uvh oracleasm-2.6.18-238.12.1.0.1.el5-2.0.5-1.el5.x86_64.rpm
Preparing... ##### [100%]
 1:oracleasm-support ##### [100%]
```

```
# rpm -Uvh oracleasm-lib-2.0.4-1.el5.x86_64.rpm
Preparing... ##### [100%]
 1:oracleasm-support ##### [100%]
```



Hint: oracleasm-support rpm has to be installed before oracleasm rpm – otherwise an error will occur:

```
# rpm -Uvh oracleasm-2.6.18-238.12.1.0.1.el5-2.0.5-1.el5.x86_64.rpm
error: Failed dependencies:
    oracleasm-support >= 2.0.0 is needed by oracleasm-2.6.18-
238.12.1.0.1.el5-2.0.5-1.el5.x86_64
```

3.3 Usage of oracleasm command:

The oracleasm command displays a short help about its usage when executed with the argument “-h”:

```
# oracleasm -h
Usage: oracleasm [--exec-path=<exec_path>] <command> [ <args> ]
    oracleasm --exec-path
    oracleasm -h
    oracleasm -V

The basic oracleasm commands are:
configure      Configure the Oracle Linux ASMLib driver
init           Load and initialize the ASMLib driver
exit           Stop the ASMLib driver
scandisks      Scan the system for Oracle ASMLib disks
status         Display the status of the Oracle ASMLib driver
listdisks      List known Oracle ASMLib disks
querydisk      Determine if a disk belongs to Oracle ASMLib
createdisk     Allocate a device for Oracle ASMLib use
deletedisk     Return a device to the operating system
renamedisk     Change the label of an Oracle ASMLib disk
update-driver  Download the latest ASMLib driver
```

Man pages are also available:

```
oracleasm          (8) - Support software for the Oracle ASM Generic
Library
oracleasm-configure (8) - Configure the Oracle ASMLib driver
oracleasm-createdisk (8) - Mark a disk for the Oracle ASM Library
oracleasm-deletedisk (8) - Unmark an ASM disk, returning it to the system
oracleasm-dropdisks (8) - Drop disks from the ASM Library
oracleasm-exit      (8) - Shut down and unload the Oracle ASMLib driver
oracleasm-help      (8) - Display help about oracleasm commands
oracleasm-init      (8) - Load and initialize the Oracle ASMLib driver
oracleasm.init [oracleasm] (8) - Startup script for the Oracle ASM Generic
Library
oracleasm-listdisks (8) - Display instantiated ASM disks
oracleasm-querydisk (8) - Display information about ASM disks
oracleasm-renamedisk (8) - Change the label on an ASM disk
oracleasm-scandisks (8) - Scan the system for ASM disks
oracleasm-status    (8) - Display the status of the Oracle ASMLib driver
oracleasm-update-driver (8) - Update the Oracle ASMLib driver software
oracleasm-update-driver-otn (8) - Update the Oracle ASMLib driver software
using the Oracle Technology Network
oracleasm-update-driver-uln (8) - Update the Oracle ASMLib driver software
using the Unbreakable Linux Network
```



3.4 Initial configuration

The initial configuration is being started with the command "oracleasm configure":

```
# oracleasm configure -i

Configuring the Oracle ASM library driver.
This will configure the on-boot properties of the Oracle ASM library
driver. The following questions will determine whether the driver is
loaded on boot and what permissions it will have. The current values
will be shown in brackets ('[]'). Hitting <ENTER> without typing an
answer will keep that current value. Ctrl-C will abort.

Default user to own the driver interface []: oracle
Default group to own the driver interface []: dba
Start Oracle ASM library driver on boot (y/n) [n]: y
Scan for Oracle ASM disks on boot (y/n) [y]: y
Writing Oracle ASM library driver configuration: done
```

Usually is the user "oracle" the owner of the driver interface, but in case of privilege separation the owner can be the grid user; the same applies to the group (here "dba"). In most configurations it makes sense to have the driver interface automatically started at system boot and also to scan for ASM(Lib) disk devices at startup.

Oracleasm processes need to be started manually if no reboot takes place after the installation:

```
# oracleasm init
Creating /dev/oracleasm mount point: /dev/oracleasm
Loading module "oracleasm": oracleasm
Mounting ASMLib driver filesystem: /dev/oracleasm
```

The device needs to be partitioned (if it supports partitioning), otherwise an error will occur:

```
# oracleasm createdisk DATA001 /dev/sdc
Device "/dev/sdc" is not a partition
```

This is an intended behavior, not a bug.

Disk creation (labelling) works fine with a partition on the disk device:

```
# oracleasm createdisk DATA001 /dev/sdc1
Writing disk header: done
Instantiating disk: done
```

The device is now configured and can be listed:

```
# oracleasm listdisks
DATA001
```

In a RAC you would have to scan for the devices on the other nodes:

```
# oracleasm scandisks
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks...
# oracleasm listdisks
DATA001
```

You can check if a disk is in use with ASM(Lib):

```
# oracleasm querydisk /dev/sdc1
Device "/dev/sdc1" is marked an ASM disk with the label "DATA001"
```



4. Drawbacks & Alternatives

4.1 Drawbacks

- ASMLib is an additional SW layer; needs to be updated separately from RDBMS resp. CRS
- A Kernel module is needed that is specific for the used kernel version
- Be careful when updating the Linux kernel version!
- Multipathing has to be configured separately
- Multipathing for partitions requires an additional step (kpartx)
- ASM allows the resize of an ASM disk; with partitioned devices an additional modification (change partition size) is needed

4.2 Alternatives

- udev

With udev the ownership and permissions can be made persistent.

udev requires the configuration of udev-rules:

```
KERNEL=="sd*1" SUBSYSTEM=="block", PROGRAM="/sbin/scsi_id -whitelisted -replace-whitespace /dev/$name", RESULT=="<UUID returned>", NAME="<custom name>", OWNER="<OS user>", GROUP=",OS group>", MODE="0660"
```

- device mapper multipath

Starting with RH / OEL 5.3 device mapper multipath allows you to configure not only an alias name but also uid, gid and permissions for the newly created multipath device.

Excerpt from /etc/multipath.conf :

```
multipath {  
    wwid          SATA_VBOX_HARDDISK_VBa64acf62-bd45b66e_  
    alias         data01  
    uid          5100  
    gid          5020  
    mode         0660  
}
```

5. Future

Oracle will not provide ASMLib Kernel Module for the Red Hat kernel anymore, starting with RHEL 6 - see "Oracle ASMLib Software Update Policy for Red Hat Enterprise Linux Supported by Red Hat (Doc ID 1089399.1)".

Quote: "For RHEL6, Oracle will only provide ASMLib software and updates when configured with a kernel distributed by Oracle. Oracle will not provide ASMLib packages for kernels distributed by Red Hat as part of RHEL6. ASMLib updates will be delivered via Unbreakable Linux Network(ULN) which is available to customers with Oracle Linux support. ULN works with both Oracle Linux or Red Hat Linux installations, but ASMLib usage will require replacing any Red Hat kernel with a kernel provided by Oracle."



6. Conclusion

The benefit of using ASMLib seems to be quite small; the usage has been made simpler with built-in kernel driver (UEK) resp. simple update command ("oracleasm update-driver") but the alternative mechanism "Device Mapper Multipath" is a standard component with recent linux distributions and gives you all you need for handling storage devices:

- Multipathing
- Persistent device naming with alias names
- Setting of uid, gid and permissions

=> So we (still) recommend to use the OS built-in mechanism which also gives you added functionality

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Additional Sources of Information

- <http://www.oracle.com/technetwork/topics/linux/index-101839.html>
 - OTN page for ASMLib
- http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/5/html/DM_Multipath/index.html
 - Information about device mapper multipath for RHEL 5
- <https://linux.oracle.com/>
 - ULN - Unbreakable Linux Network
- MOS-Note "How To Setup ASM on Linux Using ASMLIB Disks, Raw Devices or Block Devices? (Doc ID 580153.1)"
- <http://www.oracle.com/technetwork/server-storage/linux/multipath-097959.html>
 - Some notes on the configuration of Oracle ASMLib on multipath disks