

zfs-linux Roll: Users Guide



0.6 Edition



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Preface

The `zfs-linux` Roll installs and configures the ZFS device drivers for Linux. This roll implements the software available at the ZFS on Linux¹ project.

ZFS² stands for the Zetabyte File System and is a combined file system and logical volume manager designed by Sun Microsystems. The features of ZFS include data integrity verification against data corruption modes, support for high storage capacities, integration of the concepts of filesystem and volume management, snapshots and copy-on-write clones, continuous integrity checking and automatic repair, RAID-Z and native NFSv4 ACLs. ZFS is implemented as open-source software, licensed under the Common Development and Distribution License (CDDL). The ZFS name is a trademark of Oracle. The trademark was abandoned on September 20, 2011.[1]

[1] U.S. Trademark Serial # 85194050³

Notes

1. <http://zfsonlinux.org>
2. <http://en.wikipedia.org/wiki/ZFS>
3. <http://tdrapi.uspto.gov/ts/cd/casestatus/sn85194050/content.html>

Chapter 1. Installing the zfs-linux Roll

1.1. Getting the Roll

The `zfs-linux` roll supplies ZFS in source form *ONLY*. This is to comply with the licensing of ZFS that does not allow binary redistribution. This means that ZFS must be built on your frontend and the binaries added to your *local cluster* distribution.

This edition of the `zfs-linux` roll requires you to manually build and add the binary version of the roll.



The roll follows the process at <http://zfsonlinux.org> to build rpms. This has the effect of installing `zfs` kernel modules on your frontend. If you do not want this, then you should build on a development server appliance.

If you choose the `zfs-linux` roll from a Rocks central server, you the source form of the roll will be installed for you. You must then go to the directory `/opt/zfs/zfs-linux-roll-source` and build the binary version of the roll. The files in that directory are contained in the called `zfs-linux-roll-source-0.6.0-rc12.x86_64.rpm`. This source can be installed on a Rocks Development Server. To make the *binary* version of the roll

```
# cd /opt/zfs/zfs-linux-roll-source
# make binary-roll
```

If your roll rebuild completed properly, you should see output similar to the following indicating the binary packages that have been built and are part of your local binary roll

```
roll-zfs-linux-kickstart-0.6.0-0: 9f3dc5cfb37c5025924222c0707b46b2
roll-zfs-linux-usersguide-0.6-0: 05c6edbdbcf46cc1395d9e296ab427b3
spl-0.6.0-rc12: fb8230830b0524e0e8fe2328b2894df0
spl-modules-0.6.0-rc12.6.32_220.13.1.e16: 79a11d04f63b899d8b5dd1b1c5996aae
spl-modules-devel-0.6.0-rc12_2.6.32_220.13.1.e16: b42975737edb986f65635480f1ada7fe
zfs-0.6.0-rc12: 9c10037dacc5595fbdcaf527181ac878
zfs-devel-0.6.0-rc12: 073ab7f991089b46a160867c9645ad68
zfs-dracut-0.6.0-rc8: b8e0ad3d479ab1f85ffbadfc9cf24062
zfs-modules-0.6.0-rc12.6.32_220.13.1.e16: 287f75756a6aa92f8688de4b80d6c183
zfs-modules-devel-0.6.0-rc12.6.32_220.13.1.e16: 5e17ca87a58e06f63bbeb6ed46b834d3
zfs-source-roll-0.6.0-1: 5c9de1926da9c9cd53293a7d5b60acd8
zfs-source-modules-0.6.0-1: 13995fa53ffd2f7d12e7cd9f77336a93
zfs-test-0.6.0-rc12: eff799a298b011bf49bf73359a4cc54e
```

If you build on a development server, you must first copy the created iso image to the frontend. Once you have the iso image (in the directory where you made the binary roll on the frontend or copied to the frontend from a development server, you need to add the roll and rebuild the distribution.

```
# rocks add roll zfs-linux*iso
# rocks enable roll zfs-linux
# pushd /export/rocks/install
# rocks create distro
# popd
```

At this point, any *client* nodes can be reinstalled with ZFS support. You can enable ZFS on your frontend by "running" the roll on the frontend

```
# rocks run roll zfs-linux | sh
```

1.1.1. Enabling ZFS Support on nodes/appliances

Any node or appliance can have ZFS support added to it. Whether or not ZFS is installed on a node is controlled by an attribute called `zfs`. The attribute should be set to true, if ZFS support is desired for the node.

Example: to enable ZFS on all NAS appliances, do the following

```
# rocks add appliance attr nas attr=zfs value=true
```

Chapter 2. Updating the zfs-linux Roll

2.1. Updating the Roll

ZFS on Linux is still an in-development software and has reasonably frequent updates. It is often useful to update the zfs software without resorting to a full reinstallation of a system. This section will describe how to do that and at the same time make sure the roll is in the *local cluster* distribution.

This version of the zfs-linux roll requires you to manually build and add the binary version of the roll.



The roll follows the process at <http://zfsonlinux.org> to build rpms. This has the effect of installing zfs kernel modules on your frontend. If you do not want this, then you should build on a development server appliance.

2.1.1. Getting the updated roll source

If the ZFS source roll is not available for the version of ZFS-on-Linux that you require, then you should go to github.com. In particular, <https://github.com/rocksclusters/zfs-linux>. You should clone the repository. The following shows read-only access to the github repository.

```
# git clone https://github.com/rocksclusters/zfs-linux.git
# cd zfs-linux
# make binary-roll
```



Please see the section on "Installing the Roll" to see a proper build. Remember to add the binary roll (iso image) that was created above and then recreate the distribution on the frontend

As a quick reference you should do the following to update the zfs roll with the version you just created. Removal of the old roll is recommended.

```
# rocks remove roll zfs
# rocks add roll zfs*iso
# rocks enable roll zfs
# (cd /export/rocks/install; rocks create distro)
```

Now that your updated binary has been created and you have properly rebuilt the distribution, you can update the RPMS of a system that has its ZFS RPMS already installed. If ZFS is running on a node it is recommended to first stop zfs and then unload the zfs modules (this works also for a frontend)

```
# zfs umount -a
# service zfs stop
# rmmod zfs zcommon znvpair zav1 zunicode spl zlib_deflate
```

At this point, ZFS is no longer active and can be updated. The following should properly accomplish the update

```
# yum clean all
# yum update zfs
# service start zfs
```

The following, very long screen dump illustrates the output of the update process. Please note it can take several minutes for the update to complete because DKMS is rebuilding modules.

```
Loading new spl-0.6.2 DKMS files...
First Installation: checking all kernels...
Building only for 2.6.32-279.14.1.el6.x86_64
Building initial module for 2.6.32-279.14.1.el6.x86_64
Done.

spl:
Running module version sanity check.
- Original module
  - This kernel never originally had a module by this name
- Multiple same named modules!
  - 2 named spl.ko in /lib/modules/2.6.32-279.14.1.el6.x86_64/
  - All instances of this module will now be stored for reference purposes ONLY
  - Storing in /var/lib/dkms/spl/original_module/2.6.32-279.14.1.el6.x86_64/x86_64/collisions/
    - Stored /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/spl.ko
    - Stored /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/spl/spl.ko
- Installation
  - Installing to /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/

splat.ko:
Running module version sanity check.
- Original module
  - This kernel never originally had a module by this name
- Multiple same named modules!
  - 2 named splat.ko in /lib/modules/2.6.32-279.14.1.el6.x86_64/
  - All instances of this module will now be stored for reference purposes ONLY
  - Storing in /var/lib/dkms/spl/original_module/2.6.32-279.14.1.el6.x86_64/x86_64/collisions/
    - Stored /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/splat.ko
    - Stored /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/spl/splat/splat.ko
- Installation
  - Installing to /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/
Adding any weak-modules

Running the post_install script:

depmod...

DKMS: install completed.
  Updating   : zfs-dkms-0.6.2-1.el6.noarch

DKMS: install completed.
  Updating   : zfs-dkms-0.6.2-1.el6.noarch
Loading new zfs-0.6.2 DKMS files...
First Installation: checking all kernels...
Building only for 2.6.32-279.14.1.el6.x86_64
Building initial module for 2.6.32-279.14.1.el6.x86_64
Done.

zavl:
```



```
Running module version sanity check.
Error! Module version 5835515F233A845D5B11799 for zavl.ko
is not newer than what is already found in kernel 2.6.32-279.14.1.el6.x86_64 (5835515F233A845D5B11799)
You may override by specifying --force.
```

```
znpair.ko:
Running module version sanity check.
- Original module
  - This kernel never originally had a module by this name
- Installation
  - Installing to /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/
```

```
zunicode.ko:
Running module version sanity check.
Error! Module version 943EB776D6CC4E1BCED8C36 for zunicode.ko
is not newer than what is already found in kernel 2.6.32-279.14.1.el6.x86_64 (943EB776D6CC4E1BCED8C36)
You may override by specifying --force.
```

```
zcommon.ko:
Running module version sanity check.
Error! Module version AAF52164DACC53F936858E for zcommon.ko
is not newer than what is already found in kernel 2.6.32-279.14.1.el6.x86_64 (AAF52164DACC53F936858E)
You may override by specifying --force.
```

```
zfs.ko:
Running module version sanity check.
- Original module
  - This kernel never originally had a module by this name
- Installation
  - Installing to /lib/modules/2.6.32-279.14.1.el6.x86_64/extra/
```

```
zpios.ko:
Running module version sanity check.
Error! Module version B42A8936432BDCB399805C0 for zpios.ko
is not newer than what is already found in kernel 2.6.32-279.14.1.el6.x86_64 (B42A8936432BDCB399805C0)
You may override by specifying --force.
Adding any weak-modules
```

Running the post_install script:

```
depmod...
```

```
DKMS: install completed.
Updating      : zfs-0.6.2-1.el6.x86_64
Updating      : zfs-dracut-0.6.2-1.el6.x86_64
Updating      : zfs-test-0.6.2-1.el6.x86_64
Cleanup       : zfs-test-0.6.1-1.el6.x86_64
Cleanup       : zfs-0.6.1-1.el6.x86_64
Cleanup       : zfs-dracut-0.6.1-1.el6.x86_64
Cleanup       : zfs-dkms-0.6.1-2.el6.noarch
```

You may see an error that lsscsi package does not exist. This is because the package is not part of the standard OS roll, but is part of the CentOS Distribution. To fix this problem

```
# yum --enablerepo=base install lsscsi
# yum update
```

```
# reboot
```

Chapter 3. Using the zfs-linux Roll

3.1. Using the zfs-linux Roll

General Information about ZFS on Linux and be found at the [zfs on linux web site](#)¹. General Tutorials for Using ZFS on Linux and be found at the [zfs on linux documentation](#)².

3.2. Updating The Device Drivers

The Rocks ZFS-linux roll comes with a Makefile `/opt/zfs/Makefile`. If your client node runs a different kernel (via updates or other choice), then using the `rebuild` target of this Makefile will rebuild the `spl` (Solaris Porting Layer) and `zfs` kernel modules. The `rebuild` targets checks first if the modules already exist.

```
# cd /opt/zfs
# make rebuild
```



The startup script `/etc/init.d/zfs-modules` will automatically check and rebuild the ZFS modules.

Notes

1. <http://zfsonlinux.org/>
2. <http://zfsonlinux.org/>

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