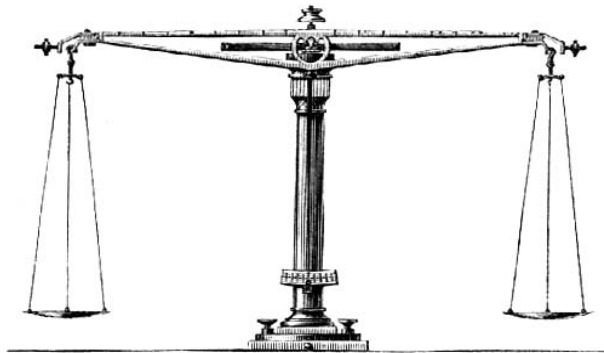


BalanceNG Release 1.x

A Generic IP Load Balancing Solution on Linux

White Paper Running BalanceNG diskless from USB Stick



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1 Introduction

This white paper shows how to install and operate BalanceNG with Devil-Linux 1.2.4 from a 256 Megabyte USB stick.

The result is a nice, diskless Load Balancer without any moving parts.

Using an USB stick with a write protection switch gives another level of security.

Please note that we don't guarantee anything, following the instruction in this white paper is absolutely at your own risk !

2 Preparation and Installation

Installation is being done as follows. We were using a Gentoo Linux system running a 2.6 kernel. USB and loopback device support have to be enabled in the kernel.

2.1 Choose an USB Stick

First get an USB 2.0 USB stick with a minimum capacity of 256 Megabytes and a write protection switch. We have been using the Sharkoon Flexi Drive successfully but any other USB 2.0 stick should work perfectly.



The "Sharkoon Flexi Drive" USB Stick (256MB)

2.2 Download and Extract the Devil-Linux Distribution

Devil Linux is available at <http://www.devil-linux.org>. The most recent version at time of creation of this document is Devil-Linux 1.2.4.

You will end up with a bzip2 compressed tar archive, the extraction process looks like that:

```
xample$ ls -l
total 175184
-rw-r--r-- 1 tommy users 179204667 Mar 17 10:06 devil-linux-1.2.4-i486.tar.bz2
xample$ tar xvf devil-linux-1.2.4-i486.tar.bz2
./
devil-linux-1.2.4-i486/
devil-linux-1.2.4-i486/docs/
devil-linux-1.2.4-i486/docs/html/
devil-linux-1.2.4-i486/docs/html/ch01s01.html
devil-linux-1.2.4-i486/docs/html/ch01s02.html
devil-linux-1.2.4-i486/docs/html/ch01s03.html
devil-linux-1.2.4-i486/docs/html/apa.html
devil-linux-1.2.4-i486/docs/html/ch01s04.html
devil-linux-1.2.4-i486/docs/html/apb.html
devil-linux-1.2.4-i486/docs/html/ch01s05.html
devil-linux-1.2.4-i486/docs/html/apc.html
devil-linux-1.2.4-i486/docs/html/ch01s06.html
```

```
devil-linux-1.2.4-i486/docs/html/apd.html
devil-linux-1.2.4-i486/docs/html/ch01.html
devil-linux-1.2.4-i486/docs/html/ch01s07.html
devil-linux-1.2.4-i486/docs/html/ape.html
devil-linux-1.2.4-i486/docs/html/ch02.html
devil-linux-1.2.4-i486/docs/html/ch01s08.html
devil-linux-1.2.4-i486/docs/html/apf.html
devil-linux-1.2.4-i486/docs/html/ch03.html
devil-linux-1.2.4-i486/docs/html/ch03s01.html
devil-linux-1.2.4-i486/docs/html/ch03s02.html
devil-linux-1.2.4-i486/docs/html/ch03s03.html
devil-linux-1.2.4-i486/docs/html/ch03s04.html
devil-linux-1.2.4-i486/docs/html/ch03s05.html
devil-linux-1.2.4-i486/docs/html/documentation.css
devil-linux-1.2.4-i486/docs/html/index.html
devil-linux-1.2.4-i486/docs/html/images/
devil-linux-1.2.4-i486/docs/html/images/warning.png
devil-linux-1.2.4-i486/docs/html/images/toc-blank.png
devil-linux-1.2.4-i486/docs/html/images/blank.png
devil-linux-1.2.4-i486/docs/html/images/note.png
devil-linux-1.2.4-i486/docs/html/images/toc-plus.png
devil-linux-1.2.4-i486/docs/html/images/important.png
devil-linux-1.2.4-i486/docs/html/images/tip.png
devil-linux-1.2.4-i486/docs/html/images/home.png
devil-linux-1.2.4-i486/docs/html/images/toc-minus.png
devil-linux-1.2.4-i486/docs/html/images/prev.png
devil-linux-1.2.4-i486/docs/html/images/up.png
devil-linux-1.2.4-i486/docs/html/images/next.png
devil-linux-1.2.4-i486/docs/html/images/logo.png
devil-linux-1.2.4-i486/docs/html/images/draft.png
devil-linux-1.2.4-i486/docs/html/images/caution.png
devil-linux-1.2.4-i486/docs/html/ch02s01.html
devil-linux-1.2.4-i486/docs/html/apfs01.html
devil-linux-1.2.4-i486/docs/html/ch02s02.html
devil-linux-1.2.4-i486/docs/html/apfs02.html
devil-linux-1.2.4-i486/docs/html/ch02s03.html
devil-linux-1.2.4-i486/docs/LICENSE
devil-linux-1.2.4-i486/docs/rejected_software.html
devil-linux-1.2.4-i486/docs/sources.lst
devil-linux-1.2.4-i486/docs/CHANGES
devil-linux-1.2.4-i486/DL-kernel-config
devil-linux-1.2.4-i486/DL-build-config
devil-linux-1.2.4-i486/bootcd.iso
devil-linux-1.2.4-i486/custom-cd
devil-linux-1.2.4-i486/etc.tar.bz2
devil-linux-1.2.4-i486/install-on-usb
tar: A lone zero block at 410720
xample$
```

We ignored the "lone zero block" warning.

2.3 Preparation of etc.tar.bz2

BalanceNG being an init script compatible program can be stored in the /etc/init.d directory. That fits perfectly to Devil-Linux, since the complete /etc directory tree is being kept variable in a .bz2 compressed archive.

The only thing to do is to prepare a special etc.tar.bz2 file with the BalanceNG binary "bng" in it and an additional symbolic link. The process for this is as follows (starting from the extraction directory):

```
xample$ cd devil-linux-1.2.4-i486
xample$ tar xvj etc.tar.bz2
xample$ cp <path to bng distribution>/bng ./etc/init.d/bng
xample$ cd etc/init.d/rc3.d
```

```
sample$ ln -s ../bng ./S99bng
sample$ cd ../../..
sample$ mv etc.tar.bz2 etc.tar.bz2.orig
sample$ tar cfj etc.tar.bz2 etc
sample$
```

After these steps an updated etc.tar.bz2 file has been prepared containing the bng binary and the startup link.

2.4 Changing and Running "install-on-usb"

Devil-linux comes with a handy "install-on-usb" script, unfortunately the preservation of ownership caused problems for us so we recommend the following change:

change line 43 in "install-on-usb" from

```
nice cp -p $1 $2 || return 1
```

to

```
nice cp $1 $2 || return 1
```

by removing the "-p" (we found no other way to circumvent this problem).

Now start this with root permissions. The process until partitioning is as follows (User supplied input in bold):

```
sample$ sudo su
sample$ ./install-on-usb
```

This will install the Devil Linux ISO image to a disk device (USB/SCSI/IDE) and make it bootable, assuming that your PC can boot this device.

Select which bootloader you want to use:

- 1) SysLinux
- 2) Grub
- 3) Grub with serial console
- 4) Lilo

Choice: **1**

Select correct initrd.gz format used (DL default is CramFS):

- 1) CramFS
- 2) Ext2

Choice: **1**

Enter DL ISO source (disk file or CD device) -> **./bootcd.iso**
Devil Linux 1.2.4 found in ISO

Enter DEVICE name of disk device (e.g. /dev/sda) -> **/dev/sda**
Partition Table for /dev/sda

#	Type	First Sector	Last Sector	Offset	Length	Filesystem Type (ID)	Flag
1	Primary	0	511998*	32	511999*	FAT16 (06)	Boot
	Pri/Log	511999*	511999	0	1*	Free Space	None

Please make sure the partition type is 'FAT16' (06)

If you wish to store the ISO and configuration on the same media, two partitions are recommended.

Do you want to partition the media first? (y/n) **y**

This starts cfdisk, we configured two devices, sda1 having 250 Megabytes and being bootable, and sda2 with the remaining space (12 Megabytes) for the etc-tarball (**Important: set both partition types to 06 (FAT16) and don't**

forget to "write" your partition information).

After this the process continues as follows:

```
Enter PARTITION name of disk device to put ISO file (i.e. /dev/sda1) -> /dev/sda1
Expanding link to full partition name for devfs :
/dev/scsi/host0/bus0/target0/lun0/part1
Expanding link to full device name for devfs : /dev/scsi/host0/bus0/target0/lun0/disc
```

```
Enter configuration file to preload to disk (if any) -> ./etc.tar.bz2
Enter separate partition for configuration (recommended) or enter if same -> /dev/sda2
```

```
All data on device /dev/sda2 will be lost, continue ? (y/n) y
```

```
Last chance, do you really want to continue ? (y/n) y
mke2fs 1.35 (28-Feb-2004)
```

```
This will install DL on "/dev/scsi/host0/bus0/target0/lun0/disc" using the "syslinux"
bootloader.
```

```
All data on device /dev/scsi/host0/bus0/target0/lun0/part1 will be lost, continue ?
(y/n) y
```

```
Last chance, do you really want to continue ? (y/n) y
```

```
Installing syslinux MBR
0+1 records in
0+1 records out
installing SysLinux boot sector
copying files
copying source file ./bootcd.iso to device mounted on ./tmp-install2usb/disk-
mnt/bootcd.iso
```

```
Copying ./etc.tar.bz2 to ./tmp-install2usb/etc-mnt/etc.tar.bz2
syncing and unmounting (this could take a while)
xample$
```

After this the USB stick is ready to be booted on the target device.

2.5 Final Steps

For finalizing the setup the following steps have to be performed:

1. Booting the target device, from the stick, log in as root (empty password).
2. Start the "setup" utility by typing "setup"
3. Change the Hostname in Basic/Hostname
4. disable all services, enable SSHD and (optional) NET-SNMP only (in Services)
5. Optional: Setup a minimal SNMP configuration file in /etc/snmpd.conf with a content like this (replace syslocation and syscontact information accordingly):

```
syslocation      Inlab Software
syscontact       info@inlab.de
syservices       12
rocommunity      public
rwcommunity      secret .1.3.6.1.4.1.2771.1
agentuser        root
agentaddress     161
pass             .1.3.6.1.4.1.2771.1 /etc/init.d/bng
```

6. Change the root-password
7. exit to the shell with "Exit".
8. setup the ifcfg-files in /etc/sysconfig/nic/ (you will have to know the kernel module names for the interfaces cards).
9. execute "save-config" to make the changes permanent.
10. Then reboot.

2.6 Working with BalanceNG

As soon as eth0 is up and running BalanceNG will automatically start at reboot. The interactive control mode may be invoked with `/etc/init.d/bng control` as in the Manual. A "save"-command stores the BalanceNG configuration to `/etc/bng.conf`, to make this permanent the Devil-Linux "save-config" command has always to be executed.

As soon as the configuration is ready for production use, be sure to set the write protection switch to "locked" to avoid accidentally changing the configuration and to increase security.

2.7 Further Support

Please contact the Devil-Linux support contacts if you are experiencing problems with the Devil-Linux distribution.

Please direct BalanceNG specific problems and questions via email to the contacts provided at the following URL:

<http://www.inlab.de/balanceng/support.html>

Newest BalanceNG information, documentation and releases are available at the BalanceNG website

<http://www.BalanceNG.net> .