Relax and Recover:

"The OpenSource `[mksysb]` *for Linux on Power."*

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When adversity strikes …

“If anything can go wrong… it will.” *(Murphy’s law)*

KEEP
CALM
RELAX
AND
RECOVER

My Backup Server was there !

😭

Backup Strategy and Disaster Recovery

"What should I do if a disaster strikes"

- **Backing up your server are necessary … but not enough**
  - Backups must be externalized.
  - Backup strategy must be defined (what to backup, how, when …).
  - **<u>Disaster Recovery plan must be defined.</u>**

- **What is Disaster Recovery?**

  The process by which a business function is restored to the normal, steady state after a disaster.

- **What is Business Continuity?**

  The way that a business function will operate after a disaster, until such time as the normal, steady state is restored.

Disaster Recovery Plan (DRP)

- DRP addresses need to recover from an emergency with minimum impact to the enterprise.
  - Protects enterprise from major services failure
  - Minimizes risk to enterprise from delays in providing services
  - Guarantees reliability of standby systems by testing and simulation
  - Minimizes personnel decision-making required during disaster recovery

- Backups of data are necessary! but not enough in case of losing the complete Operating System.
  - Reinstalling the OS from scratch takes hours
  - Restoring the backups a few more hours
  - Fine-tuning of configurations takes days
  - Even months later issues pop up!

- It is absolute necessary to foresee an inventory of hardware and software and use **tool to quickly rebuild completely a system :**
  - **From scratch**
  - **OS + configuration + data** *(as it was before)*
  - **Mostly Automated.** *(speedup + avoid human error)*

UNIX System Recovery Tools

Flash Archive (up to Solaris 10)

HP Ignite-UX

IBM mksysb

OS recovery tools are part of most of the UNIX since 90's !

What is the `mksysb` command?

```
#man mksysb
mksysb Command
Purpose:
Creates an installable image of the root volume group either
in a file or onto a bootable tape.
```

Source: AIX mksysb man page

Translation:

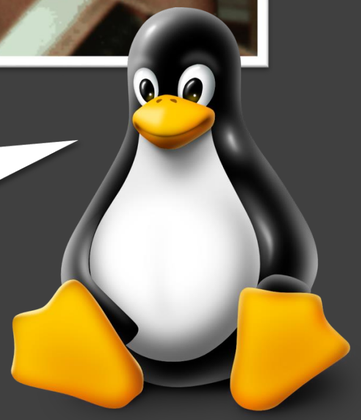
Provides System Administrators the assurance of a BMR *(Bare-Metal Recovery)* solution, a provisioning tool, or way to roll back a system after a bad update.

=> Keeps SysAdmins from losing their jobs when all hell breaks loose.

1. Bootable : *(hd5 / spot)*
2. LVM + FS Layout : *image.data*
3. System Backup : *result of AIX* **`backup`** *command*

- Stored in bootable tape or NIM server images.
- Could be restored on dissimilar POWER HW.

Linux System Recovery Tools ?



"Only wimps use tape backup:

***REAL** men just upload their important stuff on ftp and let the rest of the world mirror it."*

– Linus Torvalds –

1996-07-20: linux-kernel mailing list (link)

Linux System Recovery Tools ?

Go to the community …

Image Your Hard Drive using dd

Submitted by sandip on Fri, 02/11/2005 – 21:15

- Boot from the live cdrom distribution.
- Switch to root.
- Make sure **NO partitions** are mounted from the source hard drive.

1- Mount the external HD.

```
# mount -t vfat /dev/sda1 /mnt/sda1
```

2- Back up the drive.

```
# dd if=/dev/hda conv=sync,noerror bs=64K | gzip -c  >
/mnt/sda1/hda.img.gz
```

3- To restore your system:

```
# gunzip -c /mnt/sda1/hda.img.gz | dd of=/dev/hda
conv=sync,noerror bs=64K
```

Limitations:

- Full Backup Only
- Full restore is the only option
- Backup cannot be made “Live”. Need to reboot the server on DVD rescue to backup the server.
- Restore on the same Hardware.

Why Linux doesn't provide a tool like "mksysb" by default ?

… simply because "Linux is not UNIX" ;-) …

System Architecture	IBM (Power)	RHEL 6: Red Hat has certified 939 different servers from 42 vendors	*(x86), (x86_64), (Itanium II), (Power), (SPARC), (ARM), (System z)*
Disk Partitioning	Logical Volumes	Logical Volumes, Partitions, Software RAID, Raw Disk, Any block device!	
Filesystem Type	JFS, JFS2	Ext2,3,4, btrfs, Reiserfs, VFAT, XFS, JFS, OCFS2 ….	
Bootloader	bosboot	LILO, GRUB, GRUB2, ELILO, yaboot, lilo (SUSEppc), EXTLINUX …	

Source: Red Hat 6 Release Notes

As with many Linux products….options abound

- Some *“Linux compatible”* Backup tools :
  - SEP Sesam
  - **Relax and Recover***
  - **Storix***
  - **Cristie***
  - IBM TSM
  - HP DataProtector
  - Symantec Netbackup
  - Duplicity
  - CommVault Galaxy
  - EMC Networker
  - Bacula
  - Bareos
  - Rsync
  - GNU tar

** Close to mksysb functionalities*

Relax and Recover – *(aka ReaR)*

- **OpenSource Disaster Recovery Solution for Linux**

http://relax-and-recover.org/

https://github.com/rear/rear

GPL 3 Software – Developers in Germany and Belgium

- 100% Bash script – no GUI and no dependencies
- Utilize kernel, modules, binaries of host (kernel ≥ 2.6)
- Support any combination of SW/HW RAID, LVM
- Internal backup on CIFS, NFS ...
- Boot media on CD/DVD, USB key and LAN (PXE)

- Successor of mkCDrec

ReaR – Main Principle

- **Which backup mechanism to use?**
  - Internal : GNU tar, rsync
  - External : Bacula, Commercial backup program
- **Where will the backups reside?**
  - external USB disk, tape, local spare disk
  - Remote network location:
    - NFS share
    - CIFS share
    - sshfs *(via fuse)*
- **How shall we start the rescue image?**
  - CDROM (ISO image)
  - tape (OBDR)
  - USB disk
  - Network (PXE)

Installing Relax and Recover

- **With your preferred package manager.**
  - Rear is included in several Linux official repo's (Fedora, EPEL and SLES)

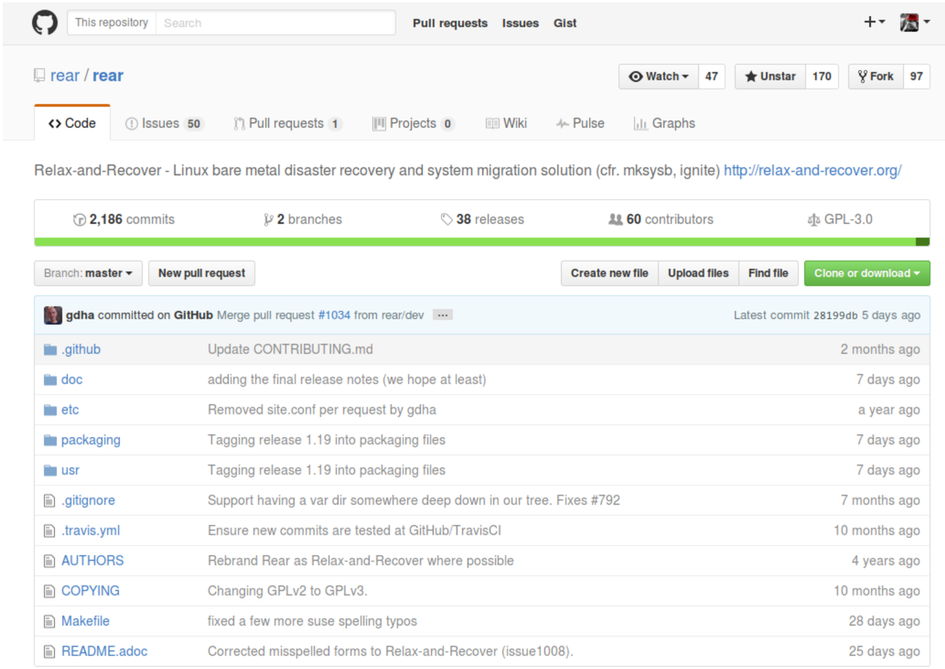
    (It is now shipped in RedHat and Sles HA extension.)
    - `yum install rear`
    - `zypper install rear`
    - `apt-get install rear`
  - But not always the latest stable version available.

- **Directly from the source repository.**
  - Github : https://github.com/rear/rear

```
# git clone https://github.com/rear/rear
# cd rear
(# git checkout rear-2.00)
# make
# make install
```

  - Possibility to generate packages :
    - rpm package : `make rpm`
    - debian package : `make deb`

      More information https://github.com/rear/rear/blob/master/README.adoc



ReaR – [command] usage

- Rear is very easy to use : **`rear [options] <command>`**

```
Available options:
 -h --help            usage information
 -c DIR               alternative config directory; instead of /etc/rear
 -d                   debug mode; log debug messages
 -D                   debugscript mode; log every function call (via 'set -x')
 --debugscripts SET   same as -d -v -D but debugscript mode with 'set -SET'
 -r KERNEL            kernel version to use; current: '3.10.0-327.22.2.el7.ppc64le'
 -s                   simulation mode; show what scripts rear would include
 -S                   step-by-step mode; acknowledge each script individually
 -v                   verbose mode; show more output
 -V --version         version information
```

- After initial configuration, a simple "**`rear mkbackup`**" will be sufficient to backing up your system.

```
List of commands:
 checklayout      check if the disk layout has changed
 dump             dump configuration and system information
 format           format and label media for use with rear
 mkbackup         create rescue media and backup system
 mkbackuponly     backup system without creating rescue media
 mkrescue         create rescue media only
 recover          recover the system
 validate         submit validation information
Use 'rear -v help' for more advanced commands.
```

ReaR – backup process

Linux server to Backup

*All those steps are done "**online**".*

`rear mkbackup`

1 `rear mkrescue`

Create a **Bootable** Media including:
- Disk / Raid / LVM / FS layout.
- Network configuration.

Boot media can be sent to a remote location.

2 `rear mkbackuponly`

Backup Data with possibility to send it to a remote location.

Remote Backup Server

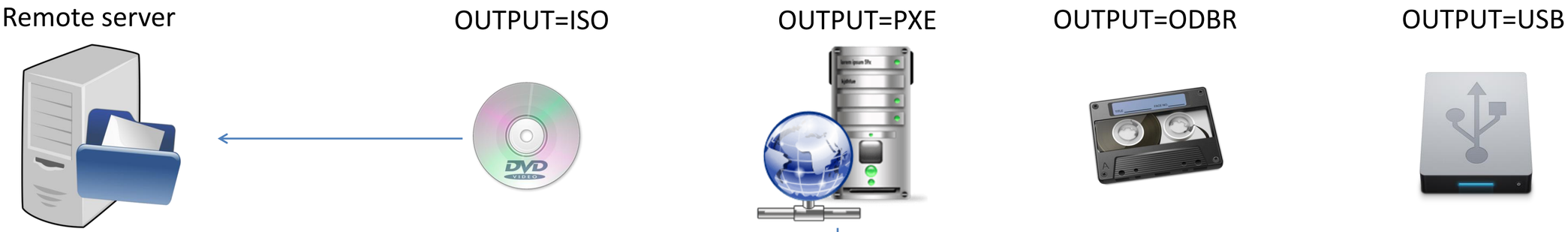
ReaR – mkrescue

- "**`rear mkrescue`**" command **creates a bootable media** with :
  - all the information needed to recreate the server FS structure
  - Set of useful tool for recovery (fdisk, partprobe …).
  - IP info => allow network recovery.

Linux server to Backup

- Format can be: ISO, USB, ODBR (tape), PXE (network)
  - Use **`OUTPUT`** variable to set rescue device type.
  - Use **`OUTPUT_URL`** to set its location (can be remote with nfs, sshfs etc..)

    if unset, **`OUTPUT_URL = BACKUP_URL`** (see **`mkbackuponly`**)




```
OUTPUT_URL=nfs://<IP>/PATH
OUTPUT_URL=ftp://<IP>/PATH
OUTPUT_URL=cifs://<IP>/PATH
OUTPUT_URL=sshfs://<IP>/PATH
```

ReaR – mkbackuponly

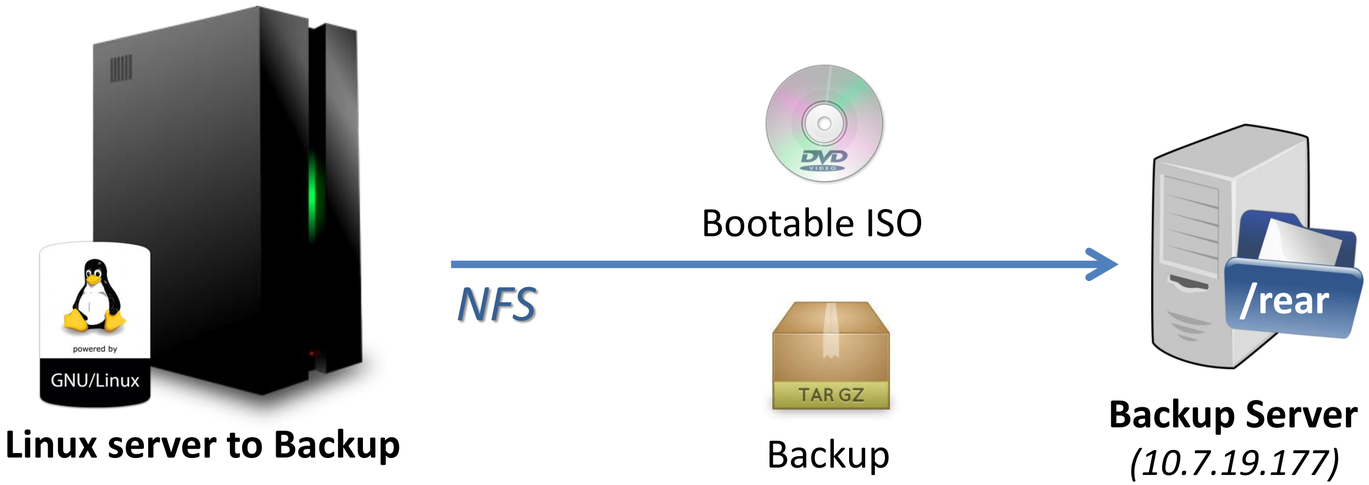
- **"`rear mkbackuponly`"** command starts the "**Real Data" backup**.

- Backup could be :
  - Internal : Managed by REAR with OS tool like TAR.
  - External : Managed by Third-Party backup product like : IBM Spectrum Protect (TSM), NetBackup, HP Protect etc …
- Internal Backup are defined via BACKUP variable
  - BACKUP = NETFS uses TAR with compression (gzip by default) to store backup in a remote server.
  - BACKUP = RSYNC uses rsync to copy files to backup to a remote server.
- BACKUP_URL defines the remote location of backup. The following remote storage protocol are supported:
  - `BACKUP_URL=file:///directory/path/`
  - `BACKUP_URL=tape:///dev/nst0`
  - `BACKUP_URL=nfs://nfs-server-name/share/path`
  - `BACKUP_URL=cifs://cifs-server-name/share/path`
  - `BACKUP_URL=sshfs://root@server/export/archives`
- More information here : https://github.com/rear/rear/blob/master/doc/user-guide/03-configuration.adoc

ReaR – configuration file *(simple example)*

- Define your Rear setting in /etc/rear/local.conf (or /etc/rear/site.conf)
  - site.conf parameter variable will be overwritten by local.conf

```
### write the rescue initramfs to USB and update the USB bootloader
OUTPUT=ISO

### create a backup using the internal NETFS method, using 'tar'
BACKUP=NETFS

### write both rescue image and backup to the device labeled BACKUP_URL
BACKUP_URL=nfs://10.7.19.177/rear

### Activate SSH with the following root password for rescue
SSH_ROOT_PASSWORD="reardemo"
```



ReaR – Recover workflow

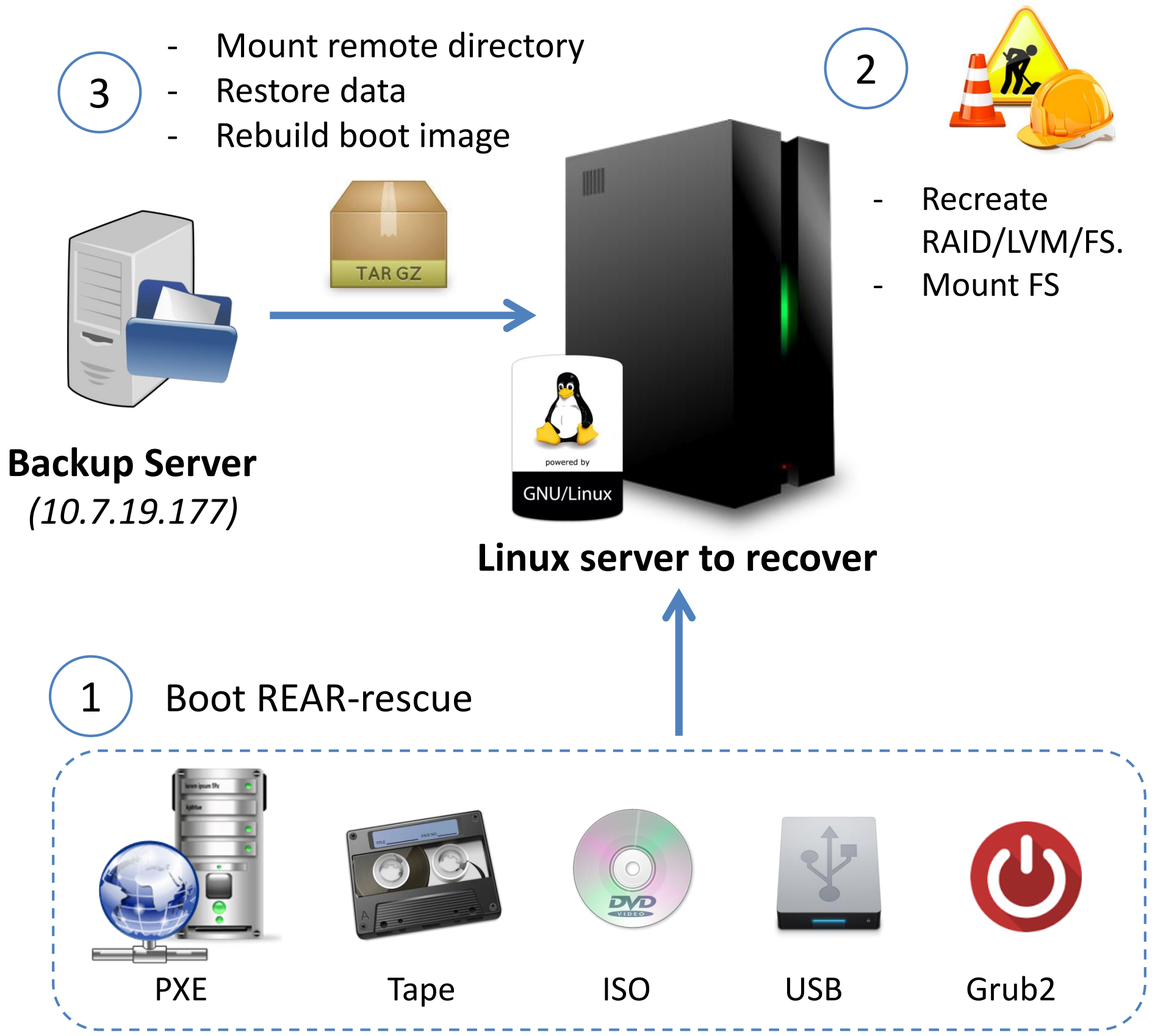
1. Boot on the REAR-rescue media

```
Relax-and-Recover 1.19-git201610141054 / 2016-10-14

Relax-and-Recover comes with ABSOLUTELY NO WARRANTY; for details see
the GNU General Public License at: http://www.gnu.org/licenses/gpl.html

Host rhel72LE-176 using Backup NETFS and Output ISO
Build date: Sat, 15 Oct 2016 14:01:05 +0200


Red Hat Enterprise Linux Server 7.2 (Maipo)
Kernel 3.10.0-327.22.2.el7.ppc64le on an ppc64le

rhel72LE-176 login: root

Welcome to Relax-and-Recover. Run "rear recover" to restore your system !

RESCUE rhel72LE-176:~ #
```

2. Run “`rear recover`”

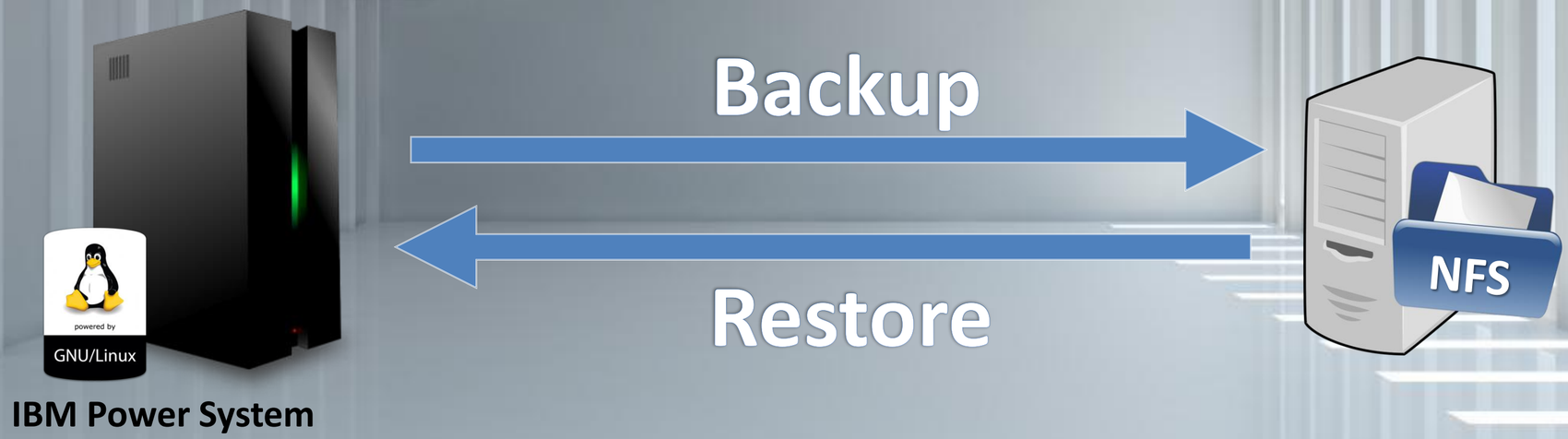
- ✓ Check HW, disk/FS layout versus backup info
- ✓ Recreate FS layout (partition/RAID/LVM/FS)
- ✓ Mount remote FS for backup restoration
- ✓ Restore the backup data
- ✓ Rebuild initrd / bootloader if needed.

3. Inspect result *(mounted in /mnt/local)* & Reboot.



Relax & Recover Demo 1

Simple Backup / Restore using ReaR with NetFS



ReaR demo 1 – Simple System Backup/Restore *(10 min)*

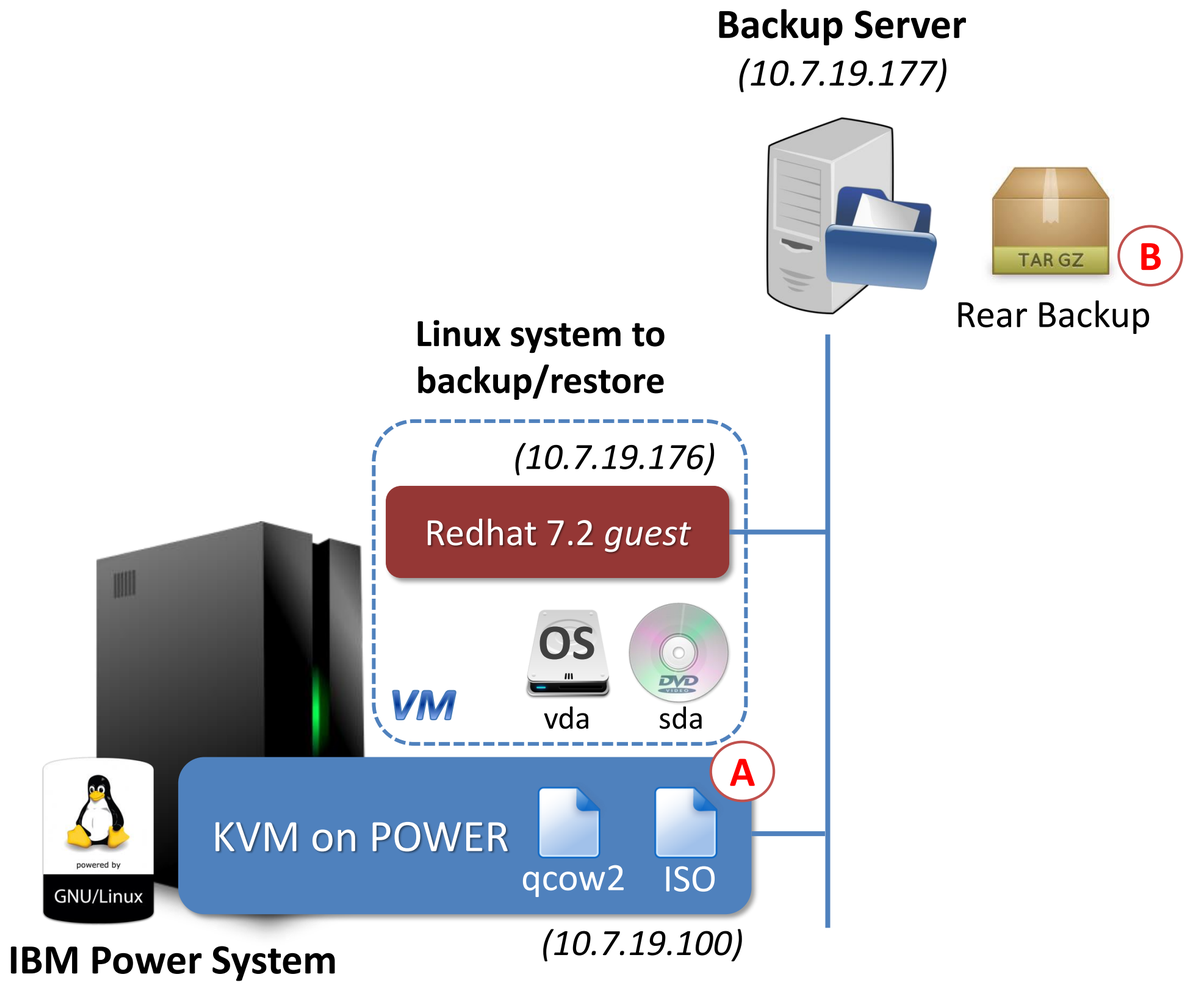
Objective: Simple backup of a KVM guest using :

- ISO image as bootable Rescue-DVD.
- NFS server to store the Backup.

1. Use "`rear -v mkbackup`" to create:
   A. A bootable DVD on the KVM host
   B. A Full tar backup on a remote server via NFS.

2. Do **something BAD** to BREAK your system *(prevent it to reboot properly.)*
3. Reboot the system … **FAILED !!!**

4. Boot on a ReaR rescue bootable device.
5. Recover the system: "`rear -v recover`"
6. Reboot again on the real system.



ReaR demo 1: "local.conf" used *(for reference)*

```
# Default is to create Relax-and-Recover rescue media as ISO image
# set OUTPUT to change that
# set BACKUP to activate an automated (backup and) restore of your data
# Possible configuration values can be found in /usr/share/rear/conf/default.conf
#
# This file (local.conf) is intended for manual configuration. For configuration
# through packages and other automated means we recommend creating a new
# file named site.conf next to this file and to leave the local.conf as it is.
# Our packages will never ship with a site.conf.


### write the rescue initramfs to USB and update the USB bootloader
OUTPUT=ISO

### create a backup using the internal NETFS method, using 'tar'
BACKUP=NETFS

### write both rescue image and backup to the device labeled BACKUP_URL
BACKUP_URL=nfs://10.7.19.177/rear

### Activate SSH with the following root password for rescue
SSH_ROOT_PASSWORD="reardemo"
```

I need more “enterprise ready” features

This is interesting … but …

- **I got hundreds of server to manage**

⇒ I don’t want to spend my *“precious”* time in copying or managing DVD “rescue media”

⇒ I would need help to migrate to migrate on **NEW hardware**.

- **I already have a “Enterprise backup solution”.**

⇒ I don’t want to backup twice

⇒ And my Backup solution has better feature like “deduplication” or point in time restore..

- **My company is *“unique”* and doing very *“special stuff”*…**

⇒ I need a *“special tool”* to backup my *“special systems”*

TAILORMADE SOLUTION

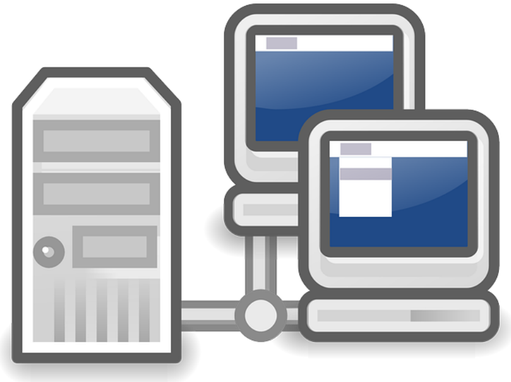
Setting up a “Net Boot” server for Linux on Power

PXE boot is not “natively” available on Linux on Power, but “grub2” provides a network-boot with similar functionality

1. Install and enable tftp service on your server *(example for RedHat here under)*
   - **`yum install tftp-server`**
   - enable tftp server by setting “**`disable=no`**” in “**`/etc/xinetd.d/tftp`**”
   - **`systemctl start xinetd && systemctl enable xinetd`**
   - Update your Firewall configuration if needed (**`firewall-cmd –add-service=tftp --permanent`**)

2. Create a **grub2 network boot** directory in your **tftpboot** directory.
   - **`grub2-mknetdir --net-directory=/var/lib/tftpboot`**
   ⇒ This will create a “**`boot`**” directory with all the files needed for a Power network boot.
   ⇒ THIS OPERATION **MUST** BE RUN ON A **LINUX ON POWER** !!!!

This is where the magic happens



Network boot server
(DHCP + BOOTP + TFTP)

3. You will have to update your **dhcpd.conf** to use **/boot/grub2/powerpc-ieee1275/core.elf** as **filename**

```
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp*/dhcpd.conf.example
#   see dhcpd.conf(5) man page
#

subnet 10.7.19.0 netmask 255.255.255.0 {
allow bootp;
next-server 10.7.19.177;  # tftpserver ip address
filename "/boot/grub2/powerpc-ieee1275/core.elf";
option routers 10.7.19.254;

    host sles11sap-144 {
       hardware ethernet 1a:f4:ea:94:64:0c;
       fixed-address 10.7.19.144;
    }
}
```

Source: https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Installation_Guide/chap-installation-server-setup.html#sect-network-boot-setup-ppc-grub2

ReaR configuration for Netboot *(POWER)*

- ReaR capability to generate “grub styled” PXE configuration will be available in ReaR 2.1.

*(You can still test it by getting latest code from **github** or use a package version > `rear-2.00-1.git201705041626.ppc64le.rpm`)*

- Use **`OUTPUT=PXE`** and **`PXE_CONFIG_GRUB_STYLE=y`** in your **`local.conf`** file to enable it.

- You also have to specify URLs where ReaR can put files generated for recovery:
  - **`PXE_TFTP_URL`**: location used to store “**`rear-kernel`**” and “**`rear-initrd`**”

  ⇒ it must point to the root of yout tftp server **`(tftpboot dir)`**

  - **`PXE_CONFIG_URL`**: location used to store the dedicated “**`grub.cfg`**” file which contain information about location of the “**`rear-kernel`**” and “**`rear-initrd`**” file.

  ⇒ It must point to **`(tftpboot dir)/boot/grub2/powerpc-ieee1275`**

  ⇒ During boot sequence, tftp client looks for a file named **`grub.cfg-<MAC_ADDRESS> or grub.cfg-<IP_HEX>`**

Extract of local.conf with PXE configuration

```
# Using PXE/NetBoot Server Rescue image
OUTPUT=PXE
PXE_CONFIG_GRUB_STYLE=y
PXE_TFTP_URL="nfs://10.7.19.177/var/lib/tftpboot"
PXE_CONFIG_URL="nfs://10.7.19.177/var/lib/tftpboot/boot/grub2/powerpc-ieee1275"
```

ReaR – Backup Software Integration

ReaR provides simple integrated full backup.

ReaR is really focus on disaster recovery and not backup.

- It could be integrated with common backup software to delegate *“file backup”* to a real backup infrastructure:
  - Backup software: Data storage and retrieval
  - ReaR: Recover system layout and make it work again
  - ReaR orchestrates the overall process and use the backup software to restore the backup data.

⇒**<u>Use the best tool for the job.</u>**

- Enabled by setting **“`BACKUP`”** variable.
- Currently compatible with :

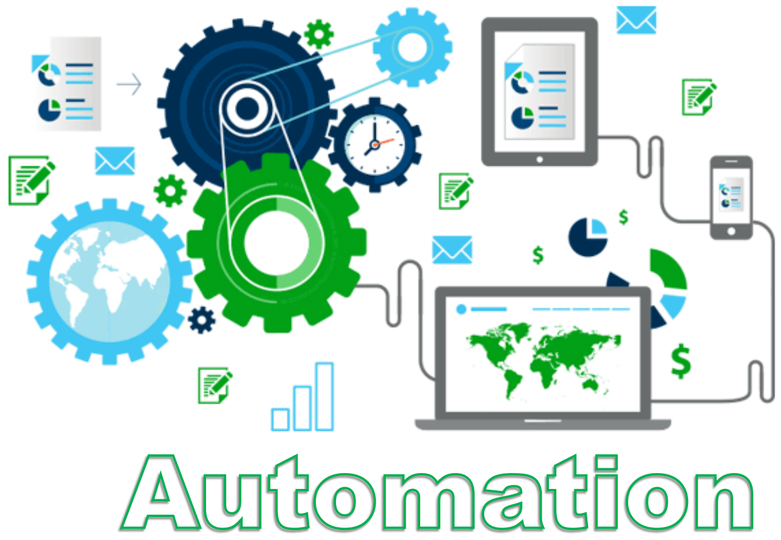
Tivoli Storage Manager (BACKUP=TSM)
HP Data Protector (BACKUP=DP)
Symantec NetBacakup (BACKUP=NBU)
Galaxy 5, 6, and 7 (BACKUP=GALAXY)
Galaxy 10 [Commvault Simpana] (BACKUP=GALAXY10)
Bacula (BACKUP=BACULA)
Bareos (BACKUP=BAREOS) *(A fork of Bacula)*

Rsync Backup Made Easy (BACKUP=RBME)
Duplicity/Duply (BACKUP=DUPLICITY)
EMC Networker, also known as Legato (BACKUP=NSR)
SEP Sesam (BACKUP=SESAM)
Borg Backup (BACKUP=BORG)
FDR/Upstream (BACKUP=FDRUPSTREAM)
Novastor NovaBACKUP DC (BACKUP=NBKDC)

ReaR – Backup Software Integration – *(tips)*

ReaR is really focus on **disaster recovery** and **not backup**. *(repeat)*

- Don't run "**`rear mkbackup`**" => use your external backup tool with scheduling policy.
- Use "**`rear mkrescue`**" to create the bootable rescue device.



⇒Don't forget to update it regularly (run `rear mkrescue`) if you

- **change your disk / FS layout (creating or resizing LV and FS)**
- **modify backup client configuration files.**

TIPS:

"**`rear checklayout`**" command determines if there is any change in the fs layout since the last "**`rear mkrescue`**".

- **`Return 0 => no change`**
- **`Return 1 => change: need to regenerate rescue device.`**

⇒ You can simply use the following cron schedule task to automate this.

```
#cat /etc/cron.d/rear
30 1 * * * root /usr/sbin/rear checklayout || /usr/sbin/rear mkrescue
```

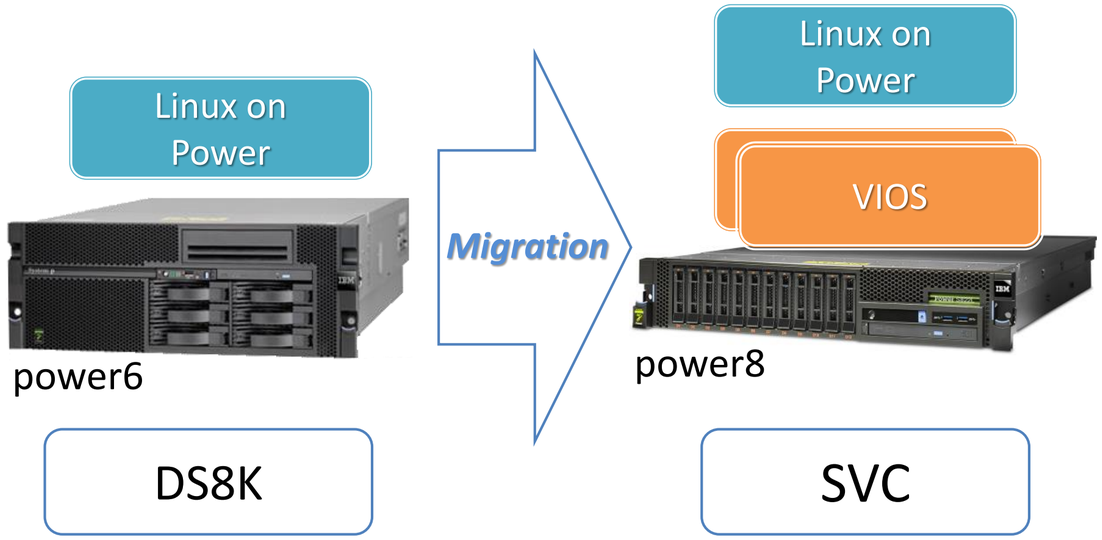
ReaR – Migration, Restoring to a different HW.

- Enable recovery on dissimilar hardware.

  *(that is not the same as the original system **but still the same arch**).*

For example:

  – P2V, V2P, V2V, P2P
  – From POWER7 to POWER8
  – From VIOS vscsi to Direct SAN
  – From PowerKVM to PowerVM
  …



- **Network :**
  – network and storage drivers are adjusted
  – remap network MAC addresses
  – use another IP address, or using dhcp via templates or from kernel command line

- **Disks :**
  – map hard disks if they do not match (e.g. hda -> sda)
  – rebuild the initial ramdisk if needed (for new storage drivers)
  – migration to SAN storage (Experimental)

Example, moving from :
- Power6 to Power8
- DS8K disk to SVC
- Dedicated IO to VIO:
  * virtual Network
  * virtual fiber (NPIV)

Relax & Recover Demo 2

1. ReaR rescue over the Network
2. ReaR integration with TSM
3. Restoration on dissimilar HW

IBM Power System

Migration

TSM

Spectrum Protect

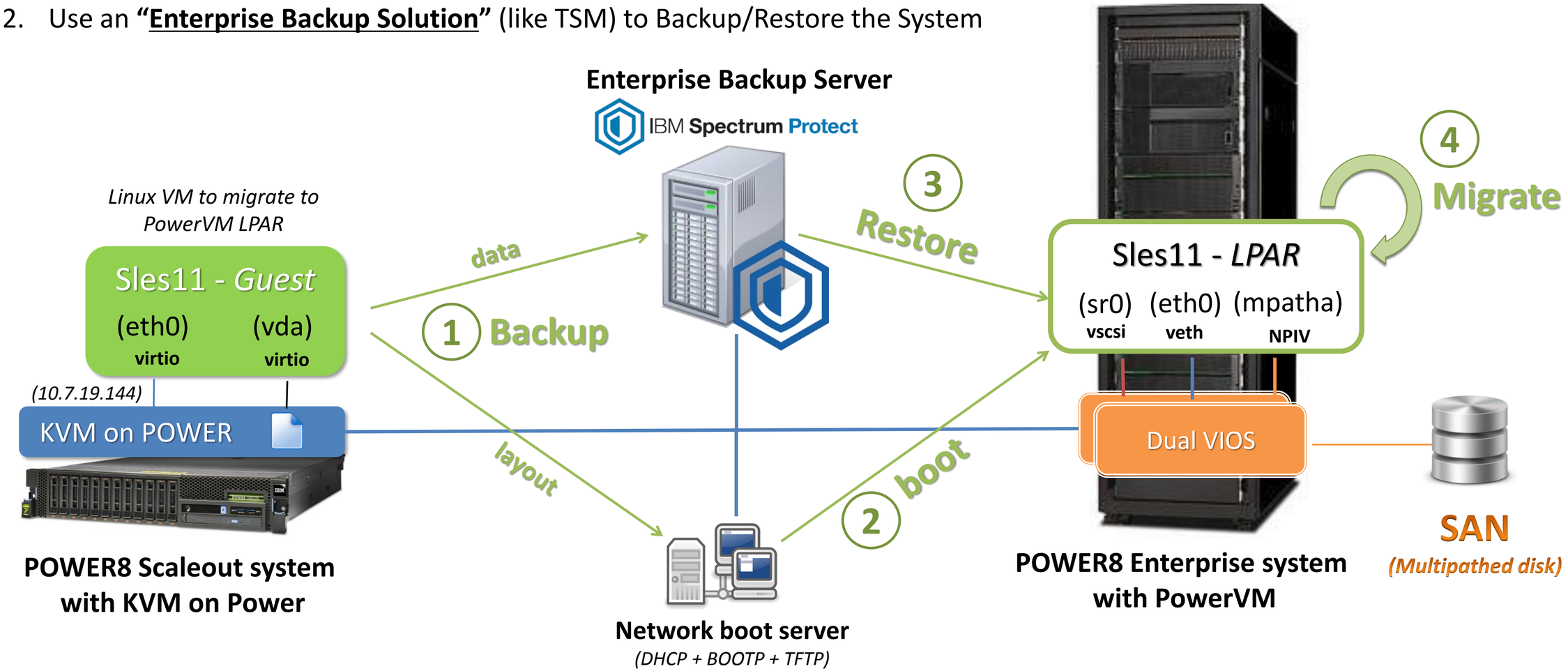
IBM Power System

ReaR demo 2 – KVM guest to PowerVM LPAR Migration. *(15 min)*

Objectives:

1. Migrate a Sles11 **KVM** guest to **PowerVM LPAR**
   - From virtio network to virtual ethernet *(New MAC !!)*
   - From virtio filebacked disk to NPIV SAN based *(vda -> mpatha)*
   - New device driver *(ibmvscsi, ibmveth, ibmvfc)* => need to rebuild **"initrd"** ramdisk.

2. Use an **"Enterprise Backup Solution"** (like TSM) to Backup/Restore the System



ReaR demo 2: "local.conf" used *(for reference)*

- By default ReaR exclude multipath device (**disable this**)
- Our target system boot over SAN disk

This will force multipath configuration during block device probing

- Use PXE to store rescue media
- PXE with grub2 mode (POWER compatible)
- **PXE_TFTP_URL** must be your tftpboot root dir.
- **OUTPUT_PREFIX_PXE** store rescue data in this subdir.
- **PXE_CONFIG_URL:** where client will find boot cmd to use

- **PXE_CREATE_LINKS=IP** : Use IP suffix instead of MAC (because we want to migrate to a different HW)

- PowerVM can have trouble during boot if "initrd" size is too BIG

Using a better compression like lzma (.xz) can help

- Reduce to the minimum the TSM client binary to copy to the ReaR rescue image => reduce initrd size.

```
# Default is to create Relax-and-Recover rescue media as ISO image
# set OUTPUT to change that
# set BACKUP to activate an automated (backup and) restore of your data
# Possible configuration values can be found in /usr/share/rear/conf/default.conf
#
# This file (local.conf) is intended for manual configuration. For configuration
# through packages and other automated means we recommend creating a new
# file named site.conf next to this file and to leave the local.conf as it is.
# Our packages will never ship with a site.conf.

# Prepare for Migration to PowerVM with BootOnSAN
AUTOEXCLUDE_MULTIPATH=n
BOOT_OVER_SAN=y

# Using PXE/NetBoot Server Rescue image
OUTPUT=PXE

PXE_CONFIG_GRUB_STYLE=y
PXE_TFTP_URL="nfs://10.7.19.177/var/lib/tftpboot"
OUTPUT_PREFIX_PXE=rear/$HOSTNAME

PXE_CONFIG_URL="nfs://10.7.19.177/var/lib/tftpboot/boot/grub2/powerpc-ieee1275"
PXE_CREATE_LINKS=IP
PXE_REMOVE_OLD_LINKS=y

# Backup TSM
BACKUP=TSM

# Reduce initrd for PowerVM
REAR_INITRD_COMPRESSION=lzma

COPY_AS_IS_TSM=( /etc/adsm/TSM.PWD /opt/tivoli/tsm/client/ba/bin/dsmc
/opt/tivoli/tsm/client/ba/bin/tsmbench_inclexcl /opt/tivoli/tsm/client/ba/bin/dsm.sys
/opt/tivoli/tsm/client/ba/bin/dsm.opt /opt/tivoli/tsm/client/api/bin64/libgpfs.so
/opt/tivoli/tsm/client/api/bin64/libdmapi.so /opt/tivoli/tsm/client/ba/bin/EN_US/dsmclientV3.cat
/usr/local/ibm/gsk8* )
```

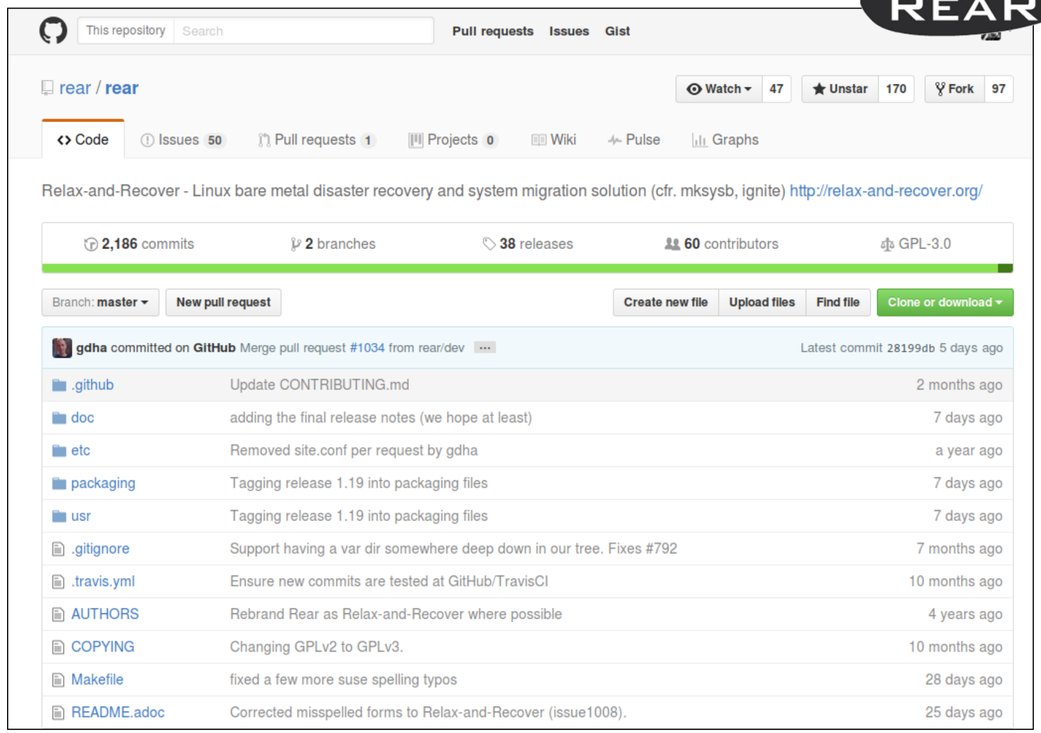
ReaR Keywords

- **Enterprise Solution**
  - Fully automated.
  - Seamless integration with most popular Enterprise Backup Solution.
- **Open Source (GPL)**
  - Source code included (100% bash).
- **Modular Design**
  - Easily extendible with new functions.
- **Scalability**
  - One solution for all Linux systems, unlimited scale-out.
- **Usability**
  - Documentation, community & commercial support.

Want to participate to the ReaR community ?

- ReaR code is hosted on github.

https://github.com/rear/rear



- Possibility to raise issues or propose modifications.
- Since 2015 (rear 1.18), some IBMers contribute to improve POWER architecture support:
  - Multipathing support
  - PowerVM Bootlist generation after recover
  - PPC64 with Yaboot support
  - PPC64LE with grub2 support
  - Ubuntu support
  - PowerKVM guest support
  - PowerNV support
  - PowerKVM <=> PowerVM Migration
  - IBM TSM integration
  - PowerVM/KVM netboot support *(grub2 netboot)*

ReaR Core Team:

- Gratien D'haese *(ReaR main author)*
- 4 main Developers *(1 from Suse)*

+ 60 contributors :

- At least "3 known" IBMers

Thanks to Jason Furmaneck (IBM USA), Masanori Mitsugi (IBM JP), Sebastien Chabrolles (IBM FR)

POWER test Matrix: https://github.com/rear/rear/wiki/Test-Matrix-rear-1.19#hardware-vendors

ReaR and POWER: support matrix & known issue

- **ReaR version and POWER support**

  Even if ReaR supports POWER arch since more than 2 years now, a lot of issues were corrected recently (especially regarding “multipathing “support).

If the version provided to the distribution doesn’t work for you, I really encourage you to test the latest version available on [github](#) *(master branch)*

Linux OS Version	PowerVM	PowerNV (baremetal)	KVM Guest	Migration*
RedHat 6 (ppc64)	OK	*N/A*	OK	OK
RedHat 7 (ppc64/ppc64le)	OK	OK	OK	OK
Suse SLES 11 SP4 (ppc64)	OK	*N/A*	OK	OK
Suse SLE 12 SP2 (ppc64le)	OK	*N/A*	OK	OK
Ubuntu 16.04 (ppc64le)	OK	OK	OK	*not tested yet*

Test performed based on rear-2.00-1.git201705111237 (rear-2.1-devel)

- **PowerVM firmware & linux kernel 256MB RMA limit**.
  - kernel and drivers need more and more place.

    initrd in rescue media (like RedHat rescue or ReaR) can be bigger than 100MB.

    => PowerVM LPAR cannot load firmware + kernel + initrd …

  New Linux kernel should switch to a 512MB RMA size.

  This should be included in RHEL 7.4 and a backport for RHEL 7.3 is in discussion.

  BUGZILLA

  Workaround: Use “`REAR_INITRD_COMPRESSION=lzma`” in your “`local.conf`“ file.

  It should reduce your initrd size by half, but use more CPU time to be generated.

```
PowerVM RHEL7.3

OF stdout device is: /vdevice/vty@30000000
Preparing to boot Linux version 3.10.0-514.el7.ppc64 (mockbuild@ppc-
021.build.eng.bos.redhat.com) (gcc version 4.8.5 20150623 (Red Hat 4.8.5-11)
(GCC) ) #1 SMP Wed Oct 19 11:30:41 EDT 2016
Detected machine type: 0000000000000101
Max number of cores passed to firmware: 256 (NR_CPUS = 2048)
Calling ibm,client-architecture-support... done
command line: BOOT_IMAGE=/vmlinuz-0-rescue-3a0bde33ffc1407985be3a777b9748cf
root=/dev/mapper/rhel_d--zswap--rearrh-root ro crashkernel=auto
rd.lvm.lv=rhel_d-zswap-rearrh/root rd.lvm.lv=rhel_d-zswap-rearrh/swap
memory layout at init:
  memory_limit : 0000000000000000 (16 MB aligned)
  alloc_bottom : 000000000f210000
  alloc_top    : 0000000010000000
  alloc_top_hi : 0000000010000000
  rmo_top      : 0000000010000000
  ram_top      : 0000000010000000
Could not allocate memory for RTAS
EXIT called ok
>
```

BAD! :-(

Need Support ?

Gratien D'haese, *"Relax-and-Recover"* author and founder of ***"IT3 Consultants",*** provides IT services, consulting and support around ReaR and Disaster Recovery.

- **Relax-and-Recover (Rear) Consultancy Services:**
  - Help with writing & implementing DR policy
  - Designing & configuring rear as a central recovery solution
  - Proof of Concept
  - Training Session / Workshop

- **Relax-and-Recover (Rear) Support Services :**
  1. Limited Support Contract
  2. Business Hours Support Contract
  3. 24x7 Support Contract

Website: http://it3.be/rear-support/index.html

Non OpenSource: Linux System Recovery Tools

STORIX® SOFTWARE

- Founded in 1999 by the author of IBM's sysback
- Bare-metal recovery for Linux since 2002
- TSM Integration since 2007
- Bare-metal recovery for Solaris since 2008

AIX

suse A NOVELL BUSINESS

debian

Ready for IBM Tivoli software

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Thank you for your attention ...

Any Question ?

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