



# Mondo Rescue: A GPL disaster recovery and cloning solution

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WW Linux Community Lead - Open  
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# Introducing Myself

- **Software engineering and Unices since 1988**

- Mostly Configuration Management Systems (CMS), Build systems, quality tools, on multiple commercial Unix systems
- Discovered Open Source & Linux (OSL) & made first contributions in 1993
- Full time on OSL since 1995, first as HP reseller then @HP



- **Currently:**

- OSL Technology **Strategist**, EMEA EG Innovation Solution Center aka HP/Intel Solution Center, Grenoble
- HP OSL **Advocate** and Converged Infrastructure **Ambassador**
- WW Linux Community Lead for the HP **Open Source Profession**
- Solutions Linux Conference and AFUL board member. Conferences at WW level at LinuxCon, Linux.conf.au
- MondoRescue, Project-Builder.org, UUWL and PUSK **Project Lead**
- LinuxCOE, mrepo, tellico, rinse, fossology, collectl **contributor**
- FOSSBazaar/SPDX and OSL **Governance** enthusiast
- Mandriva, Mageia, Fedora **packager**



- **And also:**

- Amateur singer (Alto / Tenor) and recorder player since 1976 and Choir **director** since 1987
- CD collector since 1981 (5000+ and counting) – Concert attendance since 1976
- Amateur photograph since 1976



# Definitions

## Disaster Recovery Plan (DRP):

- Identifying, **inventorying** and classifying the critical systems and data in the enterprise (in relationship with their value for the enterprise) and consequent procedures, processes and systems to put in place to recover from a disaster.
- **Balance** between DRP implementation costs and downtime costs, or loss of data/services costs.
- Much more **paper** based than computer based. However tools are also needed as part of the plan. Also DR doesn't substitute itself to backups or archives.
- Today, among the systems to deal with, you'll have **Linux** systems.

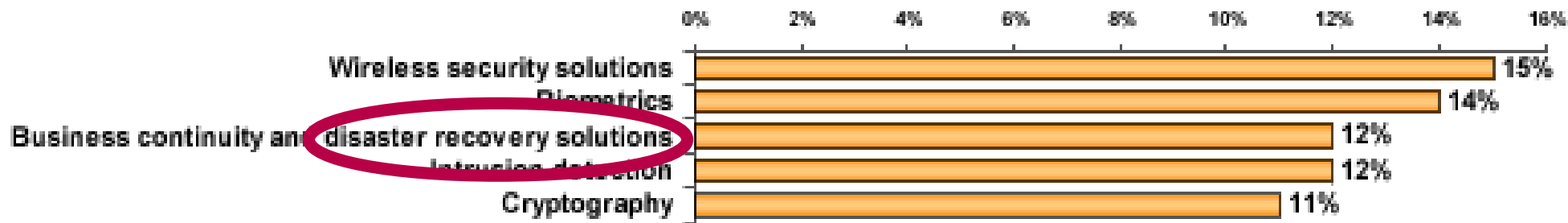
## Points to consider:

- Recovery of **solutions**: systems, network, storage, connectivity, HA configurations and coherency between those elements.
- Recovery of **system configuration** (BIOS, Stripe size, Block size, FS layout and options, Boot loader, OS data, users and application data, ...) and coherency between those elements.



# Disaster Recovery

**Figure 4 - Information Security Technologies - Planned for Deployment**



Frost & Sullivan 2008 (ISC)2 Global information security Workforce Study  
[https://www.isc2.org/download/2008\\_Global\\_WF\\_Study.pdf](https://www.isc2.org/download/2008_Global_WF_Study.pdf)

**Table 2 - Top Five Security Technologies Being Deployed by Region**

Rank	Americas	Asia-Pacific	EMEA
1	Biometrics	Wireless security solutions	Wireless security solutions
2	Wireless security solutions	Intrusion detection	Storage security
3	Business continuity and disaster recovery solutions	Business continuity and disaster recovery solutions	Biometrics
4	Intrusion detection	Biometrics	Risk management solutions
5	Cryptography	Cryptography	Business continuity and disaster recovery solutions

# Disaster Recovery on Linux

- **MondoRescue (of course ;-)** (<http://mondorescue.org>).
  - Goal of the current presentation.
- **CloneZilla** (<http://clonezilla.org/>)
  - Offline with partclone & multicast.
  - No file restoration, nor multiple media support.
- **mkCDrec** (<http://mkcdrec.ota.be/>)
  - Online with tar, sfdisk and busybox.
  - Supports OBDR.
  - Stopped with 1.0.
  - No ext4
- **ReaR** (<http://rear.sourceforge.net/>)
  - Successor of mkCDrec, less features as of now. Younger project.
  - Online with sfdisk.
- **Some other non FLOSS solutions are also available.**



# A GPL Disaster Recovery Solution

- **Distribution neutral** (Mandriva, Mageia, RedHat, Fedora, RHEL, OpenSuSE, SLES, Debian, Ubuntu, Gentoo, Slackware, ...) – x86, x86\_64, ia64
- Supports most **FS** supported by the kernel (ext2/3/4, reiserfs, XFS, BTRFS, NTFS, [V]FAT, NFS, SSHFS, SMBFS, including dual boot systems) on **any disk** supported (IDE, SCSI, FC, HW Raid, SW Raid, LVM v1/2, DM, Multipath) and boot loader (lilo/grub/grub2/elilo)
- Supports various **backup media**: CD-R[W], DVD[-+]R[W], Tapes, USB disks/keys, NFS, SSHFS, SMBFS, local FS (ISO9660 files)
- Works **live** (on-line backup), supports SELinux
- Full or differential backups supported
- CLI + curses based UI
- System DR in minutes



# Archiving with mondoarchive

- Uses either bzip2, gzip, lzo or lzma for data compression
- Uses **afio** for reliable backup (supports compression on a file basis, ASCII headers, cpio compatible) or **star**
- Generates bootable **ISO images** or burns media/creates bootable tapes or **USB disks/keys**, using **running kernel** + modules (supports multiple images)
- Saves **disk structure** and content. ProLiant HW information
- Runs on a **live system**
- Uses **mind**i to generate boot content
- Runs **interactively** or with CLI parameters



```
/usr/sbin/mondoarchive -O -d /bkp  
-s 700M -p m1 -N -T /tmp  
-E "/usr/doc|/usr/src"  
-n s1.hpintelco.org:/nfs
```



# mind

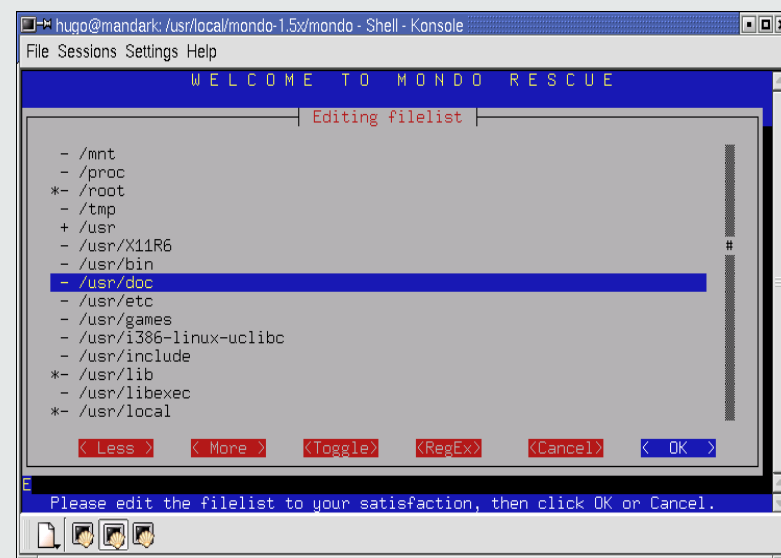
- Mind is a separate tool called by mondoarchive
- Mind provides:
  - a standalone boot environment (mini-distribution) based on the running distribution tools
  - the kernel and modules used by the running distribution or provided (dependencies are automatically managed)
  - a custom init script.
  - A boot loader depending on the media created (syslinux, isolinux, pxelinux)
- This mini-distribution is used to initiate from bare-metal the machine to restore
- Uses a custom busybox version.
- Can be used as a rescue disk alone (customization through /etc/mindi/deplist.txt)
- Mind creates the FS/LVM info used by mondorestore
- Mind also stores UUID and LABEL information if needed.
- Mind's evolution is pbmkbm part of project-builder.org





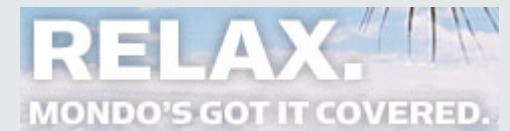
# Restoring with mondorestore

- From bootable **physical media** (CDs, tapes & OBDR, USB devices), images on disks, network (PXE), **virtual media** (HP ProLiant specific)
- Interactive** restore from image files under the OS.
- Warning: MondoRescue is not a backup tool, but a DR one.**
- HP ProLiant** hardware configuration restoration support
- Various **modes**: Automatic, Interactive, Expert, Compare
- Ability to **change** FS type, layout, SW Raid, even HW configuration.
- DR restore in minutes. But **test it** !



# Cloning support aka P2P

- Requires knowledge of master and **target** platforms (potential different drivers)
- All **drivers** should be part of the mindi image created (either used on master or forced in mindi)
- Use **-H** if master and target are identical hardware platforms
- In other cases, all functions are also available (partition resizing, filesystem type change ...) + hardware **adaptation**
- Improvement for mindi to include all drivers – TBC
- P2V is also available and documented



# Installation

- From mondo sources:
  - `tar xvfz mondo-x.y.z.tar.gz ; cd mondo-x.y.z`
  - `./bootstrap ; ./configure ; make VERSION=x.y.z ; make install`
- From mindi sources:
  - `tar xvfz mindi-x.y.z.tar.gz ; cd mindi-x.y.z`
  - `./install.sh`
- From mindi-busybox sources:
  - `tar xvfz mindi-busybox-x.y.z.tar.gz ; cd mindi-busybox-x.y.z`
  - `make oldconfig ; make busybox ;`
  - `make CONFIG_PREFIX=/usr/local/lib/mindi/rootfs install`
- Using distribution packages with yum/apt/urpmi repositories (also provides afio/buffer/perl modules)
  - `wget ftp://ftp.mondorescue.org/rhel/6/x86_64/mondorescue.repo`
  - `mv mondorescue.repo /etc/yum/repos.d ; yum install mondo`  
or
  - `wget ftp://ftp.mondorescue.org/debian/6.0/mondorescue.sources.list`
  - `mv mondorescue.sources.list /etc/apt/sources.list.d ; apt-get install mondo`



# PXE Support

- Using **PXE** boot ROM, ability to boot from a MondoRescue image content (kernel + initrd) without physical media and use remote ISO content through a network FS.
- Ability to boot from a generic deployment server based on **pxelinux** and hosting MondoRescue ISO images.

label mondo

kernel kernel/vmlinuz-mondo

append root=/dev/ram rw **pxe**

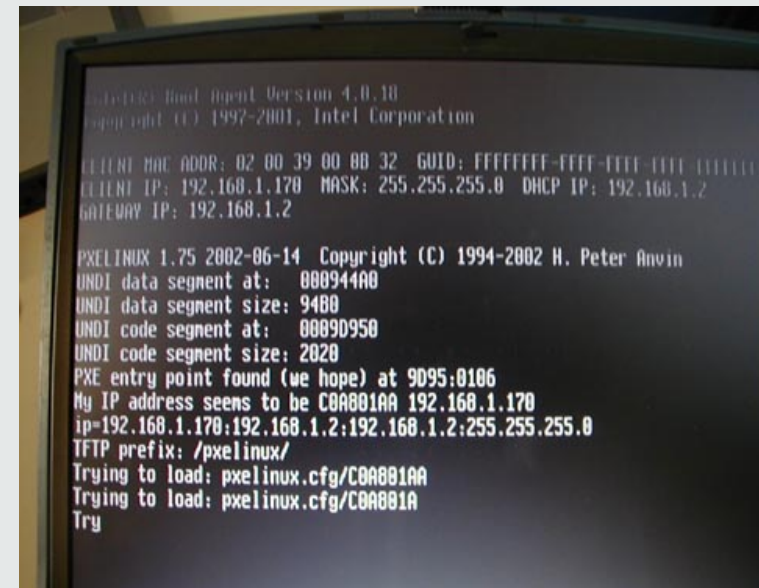
initrd=initrd/initrd-mondo.img

ramdisk\_size=32768 **proto=nfs prefix=m1**

load\_ramdisk=1 prompt\_ramdisk=0

**ipconf=eth1:192.168.0.1:255.255.255.0:**  
**192.168.0.255:192.168.0.254**

**netfsmount=192.168.0.10:/mondo ping=5**



# HP ProLiant Features

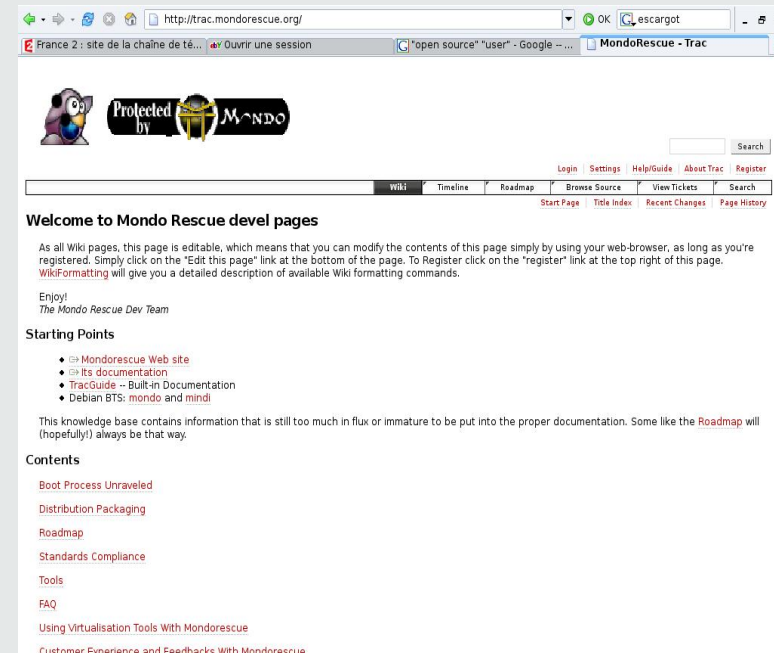
- With the **iLO** and Virtual Media function, ability to boot from a machine hosting MondoRescue ISO images through a Web interface without physical media.
- HP ProLiant servers are the most **tested** platform for obvious reasons ;-)
- **Smart Array** support (cciss & hpsa)
- ProLiant **NIC** support (bnx2, bnx2x, be2net, e1000e, e1000...)
- **Hardware** configuration info backup & recovery possible in a cloning approach (using hpacuseripting, hponcfg, conrep from **SSSTK**)
  - **Warning:** can be dangerous so not automated.
- HP REST API to be added in an upcoming version
- UEFI to be added in version 3.2.1



# Project Activities



- Project created in 2000 (Red Hat Linux 6.2) by Hugo Rabson
- My first patches (-H) in 2000. HP ProLiant support in 2004, ia64 Linux between 2001-2007, PXE in 2005, USB keys and OBDR in 2008, ext4 in 2009, multipath in 2010, SSHFS in 2011, systemd in 2014.
- Project Maintainer since Oct. 2005 with 2.04. 30 versions published with 3.2.0
- New infrastructure (SVN repository, Web site, trac)
- New Build process (Generated pkgs => lead to project-builder.org) => 120+ distribution tuples
- Documentation with MondoRescue HOWTO and wiki
- Mailing List activity
- Upcoming 3.0.5 should be the last bug fix version for 3.0 branch with systemd support
- New stable branch is now with 3.2.x branch



# MondoRescue tips and tricks

- The scratch directory should have a media size free at least
- When looking for support, join your log files (/var/log/mondoarchive.log and /var/log/mondorestore.log)
- For older distributions, you can stay for now on 3.0.x branch. Use 3.2.x for newest one based on systemd (Fedora 17+, RHEL7, SLES 12, Ubuntu 14+)
- Use the specific docs:
  - The README files (for pxe and boot parameter options)  
<http://trac.mondorescue.org/browser/branches/3.0/mindi/README.bootparam>  
<http://trac.mondorescue.org/browser/branches/3.0/mindi/README.pxe>
  - The man pages  
<http://www.mondorescue.org/docs/mondoarchive.8.html>  
<http://www.mondorescue.org/docs/mindi.8.html>  
<http://www.mondorescue.org/docs/mondorestore.8.html>
  - The wiki  
<http://trac.mondorescue.org/wiki/FAQ>



# What's new since last presentation @RMLL

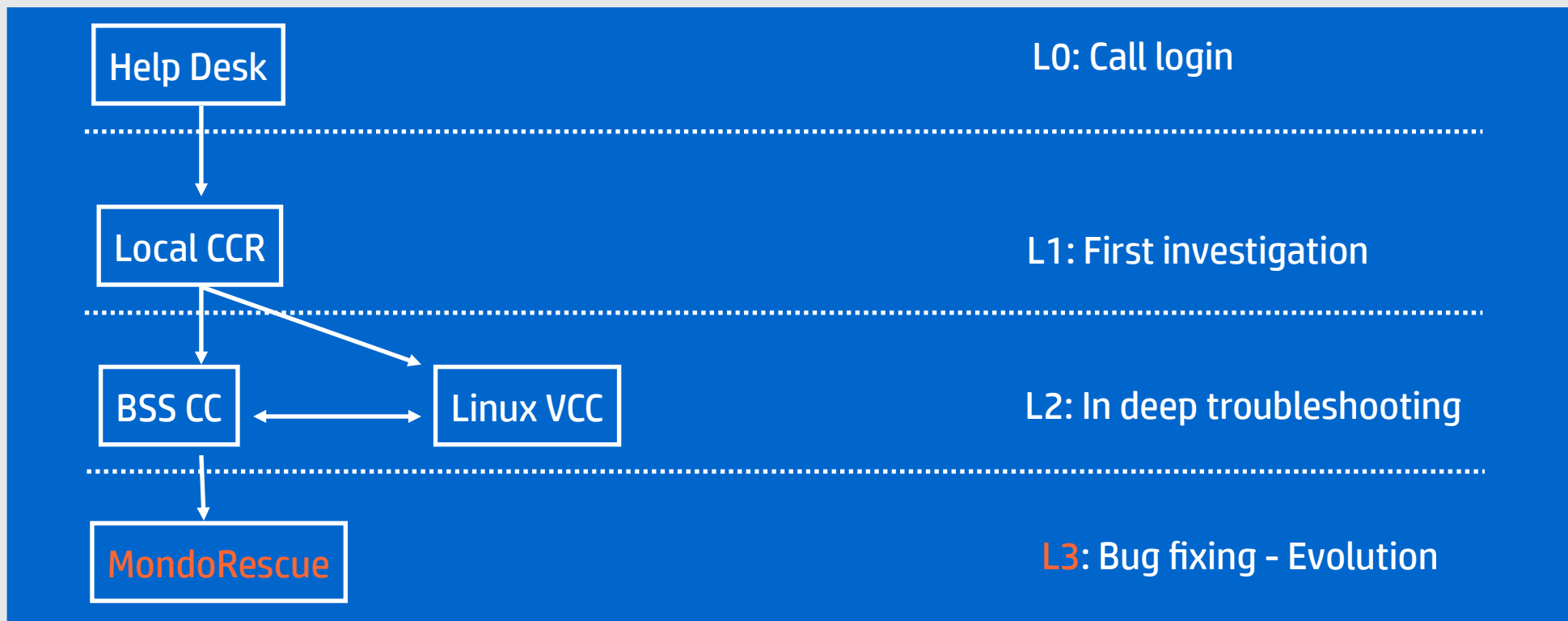
- 2.2.9.5-7 branch with improved Xen support, driver support (hpsa, virtio, xhci,/lib/firmware), dynamic exclude path, P2V doc, Arch Linux support, better logging
- 3.0.0-4 branch with improved LVM support, OBDR tape support improved, kernel 3.x support, provides hwaddr param, SSHFS support, mdadm metadata & UUID support, rpcbind support, btrfs support, GRUB2 support, keyboard issues solved, swaptbl support, star support including sparse file, fix serial port support, -M & -F options added to mondoarchive, improved scratchdir & tmpdir management, resot boot menu improved
- 3.2.x branch with huge rewrite around dynamic memory management, new perl package providing functions and scripts (links, ldd, network conf, parted2fdisk...), support for systemd based distros (RHEL7, SLES12, Ubuntu 14+, Fedora 17+, Mageia4+, Debian 8+), XFS labels, lvmetad support, automatic module dependency support, lzma compression support added
- 3.2.1 fix big file support broken in 3.2.0 and adds UEFI full support





# And @HP ?

- **Used** by various HP organizations (HP/Intel Solution Center, CMS, APJ ESS Competency Lab, AMA ASC TSG, ES ITO, TS UK)
- **Consultancy**
- **HP support** contract part #: HA158AC MNUSWRCZ (Since Sept. 2009)



# References

- Used by many entities, from individuals up to Top500
- 2 Large NEPs for solution stacks deployment at their own customer sites on tapes and DVD.
- Large Service Provider for an hospitality services stack across 2000+ hotels in EMEA on DVD.
- Large Plane manufacturer for Disaster Recovery of their Linux systems on ISO images)
- 2 EMEA Banks for their Linux Disaster Recovery solution on ISO and DVD
- Digital Signage company for the deployment of their solution on PC with a USB key.
- World leading food processing and packaging solutions company for Disaster Recovery of their Linux Cluster.
- And the numerous one I'm even not aware of !!



# Learn MondoRescue

- Start with the **Lab** (27 pages)
- Use **man** (mondoarchive, mondorestore + mindi man pages)
- Use the **mailing-list** mondo-devel at <http://lists.sourceforge.net/mailman/listinfo/mondo-devel>
- Look at the docs, **HOWTOs**: <http://www.mondorescue.org/docs.shtml>
- And the wiki: <http://trac.mondorescue.org>
- **Download** and start using it from <ftp://ftp.mondorescue.org>



HP EMEA

HP/Intel Solution Center

HP Tech Forum 2010

## Lab - MondoRescue

### Lab Contents

This lab purpose is to install and use MondoRescue to produce a golden image of a server and restore it.

1.

### Lab Writer and Trainer

[Bruno.Cornec@hp.com](mailto:Bruno.Cornec@hp.com)

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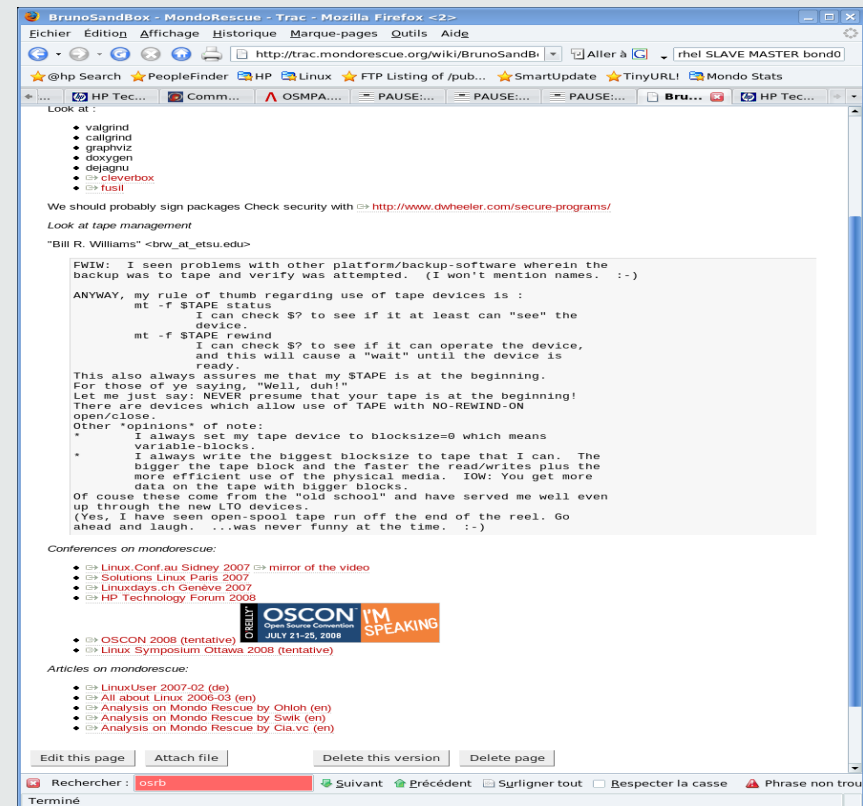
# Web Resources



- **MondoRescue main site**  
<http://www.mondorescue.org>
- **Trac / Wiki** <http://trac.mondorescue.org>
- **Busybox** <http://www.busybox.net>
- **Project-Builder**  
<http://trac.project-builder.org>
- **Open Source at HP**  
<http://opensource.hp.com>
- **HP ProLiant & Linux**  
<http://www.hp.com/go/proliantlinux>



*“The evolution of FLOSS  
and the Internet are  
tightly coupled”*



# Contact - Thanks

**Bruno.Cornec@hp.com**

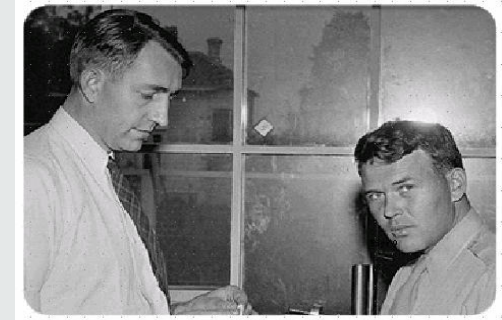
**(Open Source and Linux Technology Architect at the  
HP/Intel Solution Center)**

**<http://www.hp.com/linux>**

**<http://opensource.hp.com>**

## Thanks goes to:

**Linus Torvalds, Richard Stallman, Eric Raymond,  
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Robb, Bob Gobeille, Martin Michlmayr among  
others, for their work and devotion to the  
Open Source Software cause... and my family  
for their patience :-)**



**"Changes are never easy to make.  
There is comfort and safety in tradition, but  
change must come, no matter how painful or  
expensive it may be."**

*Bill Hewlett*

