Open Source Rescue Disks and Utilities

**Presentation by John Karr for
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What is a Rescue Disk?

- Let you perform maintenance and repair operations without loading the OS on the system being worked on.

- Rescue Disks are bootable from CD, USB, or PXE and contain a collection of utilities.

- Some Rescue Disks are specialized and some are general.

No More Floppies
Booting from CD or USB

- For a decade now computers have supported booting from CD ROM, Floppy disks are history. I won't deal with making boot floppies but it is still possible.

- For the past few years new computers have also supported boot from USB.

- Most Rescue Disks are distributed in ISO format which can be burned to a CD. Syslinux and Unetbootin will make a USB thumb drive bootable from an ISO image.

Syslinux

The syslinux command makes a Fat32 USB drive bootable, it is available on both Windows and Linux. Then you have to copy all of the files from a CD or mounted ISO image. Most Linux distributions use the isolinux variant of syslinux to boot their install cds.

syslinux.zytor.com

Using Syslinux

```
>mkdosfs /dev/sdbx -n usb_rescue
>syslinux /dev/sdbx
>mount /dev/sdbx /media/mntpnt
>mount -t iso9660              \
  myiso9660.iso /mnt/myiso -o loop
>cp -R /mnt/myiso/ /media/mntpnt/
```

There is also a windows version of syslinux, syslinux.exe. It is possible to multiboot several images from the same USB key, but in practice this is cumbersome.

unetbootin

Many Distribution's Live CDs now have an option to create a bootable USB Stick. The utility which usually provides this is unetbootin. Unetbootin will make a bootable usb from any isolinux bootable iso. It knows about many distributions and rescue disks and will even download them for you to make into a usb key.

unetbootin uses syslinux, but is much easier to use. For convenience it is available on windows and linux.

http://unetbootin.sourceforge.net/

Screenshot of unetbootin
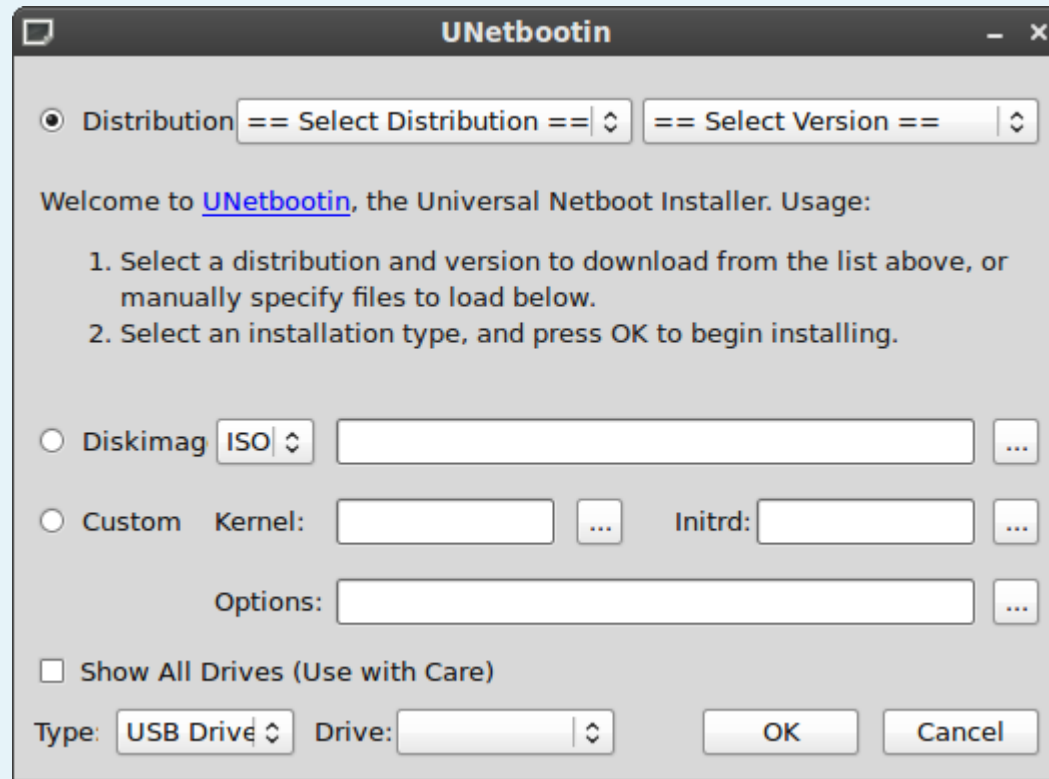
Popular Rescue Disks

- System Rescue CD
  sysresccd.org

- Trinity Rescue Kit
  http://trinityhome.org/trk

- PartedMagic
  http://partedmagic.com

- Clonezilla
  http://clonezilla.org/

System Rescue CD

- This is one of the larger images and provides only limited utilities.

- Provides an xfce environment (must type wizard to launch from console).

- Uses gparted and partimage.

- Default boot menu option doesn't work. Choose "us".

- Least useful of the projects I looked at.

PartedMagic

- This is my favorite Rescue Disk.

- Provides a working X environment with a solid assortment of the utilities a rescue disk needs, in the smallest image size (83mb).

- Key utilities: gparted (of course), clonezilla, partimage, gsmartcontrol.

```
Parted Magic Boot Options Menu (F1 for more options)

1.  Default settings (Runs from RAM)
2.  Live with default settings (CDROM locked*)
3.  Live with low RAM settings
4.  Do not eject CD (*emulators)
5.  Alternate graphical server
6.  Safe Graphics Settings (vga=normal)
7.  Failsafe Settings
8.  Console (boots to the shell)
9.  Local boot
10. Reboot
11. Memtest86+
12. Hardware Detection Tool (HDT)
13. Super Grub Disk
```

A Free Partitioning Tool

```
Default mode intended for 192MB+ based systems.
* version: 4.5, (C) 2009, Patrick Verner
* http://www.partedmagic.com
* Disclaimer: Author excluded from any liability.
```

*Parted***Magic**

PartedMagic Boot Options

- A variety of options in case the default doesn't work or you don't want the gui.

- Memtest runs tests on system memory, an important diagnostic.

- SuperGrub will only restore grub legacy. If you are using it, this can save you time if boot loader issues are why you needed a rescue disk.

My
Documents

Smart
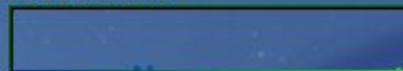Control

Clonezilla

Start
Network

Hardware
Information

Mount
Devices

Partition
Editor

Hostname: PartedMagic
Linux Kernel: 2.6.30.6-pmagic
CPU Details: i686, 2400(MHz)
CPU History:

CPU Usage: 2%

RAM Usage: 54.8MiB (2%)
Available RAM: 1.97GiB

Processes: 104   Running: 1
(top 5 sorted by CPU usage)

NAME	PID	CPU%	MEM%
conky	2870	0.20	0.08
conky	2435	0.20	0.08
clipboard-daemo	2381	0.20	0.20
Xorg	2354	0.20	0.68
notification-da	3840	0.00	0.38

(top 5 sorted by MEM usage)

NAME	PID	CPU%	MEM%
Xorg	2354	0.20	0.68
pcmanfm.bin	2438	0.00	0.49
lxpanel	2375	0.00	0.41
notification-da	3840	0.00	0.38
openbox	2382	0.00	0.24

Tuesday, 03 November 2009, 00:45
System Uptime: 0h 35m 58s

PartedMagic

A Free Partitioning Tool

00:45

Clonezilla

- Even though PartedMagic includes Clonezilla I recommend using the Clonezilla boot image instead.

- PartedMagic uses a gui and I was unable to disable power management, the system goes to sleep corrupting the copy.

- The Clonezilla CD supports SAMBA, PartedMagic does not.

Trinity Rescue Kit 3.3 *build 321*

```
Run Trinity Rescue Kit 3.3 (default)
 1 : TRK 3.3 as bootserver to boot other TRK clients
 2 : TRK 3.3 running from RAM (best >= 512mb, 256mb min)
 3 : TRK 3.3 with bigger screenfont
 4 : TRK 3.3 in simple VGA mode (debugging of kernel output)
 5 : TRK 3.3 with Belgian keyboard (see docs for other)
 6 : TRK 3.3 - Virusscan all drives (non interactive)
 7 : TRK 3.3 - Try more pcmcia and usb nics (when not detected)
 8 : TRK 3.3 - Try more SCSI drivers (when disks not detected)
 9 : TRK 3.3 with a secure shell server enabled
10 : TRK 3.3 - Execute local scripts on harddrive of PC
11: TRK 3.3 - Fileshare all drives, secured with user
11: TRK 3.3 - Fileshare all drives as guest, no security
13: TRK 3.3 - Single user mode
14: TRK 3.3 - Acpi=off, noapic  PCI=bios (Alternate boot 1)
15: TRK 3.3 - Acpi=off, noapic PCI=any (Alternate boot 2)
16: TRK 3.3 - PCI=conf2 (Alternate boot 3)
17: TRK 3.3 - Verbose startup for debugging after initial boo
```

http://trinityhome.org/trk

Trinity Rescue Kit 3.3

Trinity Rescue Kit

- Has 21 boot options, mostly you just want the default.

- Trinity is the most loaded rescue disk I looked at.

- virusscan command will download 4 different virus checkers and scan attached hard drives. Time consuming but thorough.

- There is no help on the disk, you will need the documentation available. TRK recommends printing it.

A Look at the Utilities

- Partition Maintenance

- Drive and File System Health

- Deleted File Recovery

- Dieing Disk Data Scraping

- Imaging

- Boot Loader Repair

Partition Maintenance

- gparted. Graphical Partition Editing Tool. Can move and resize both Linux and Windows Partitions.
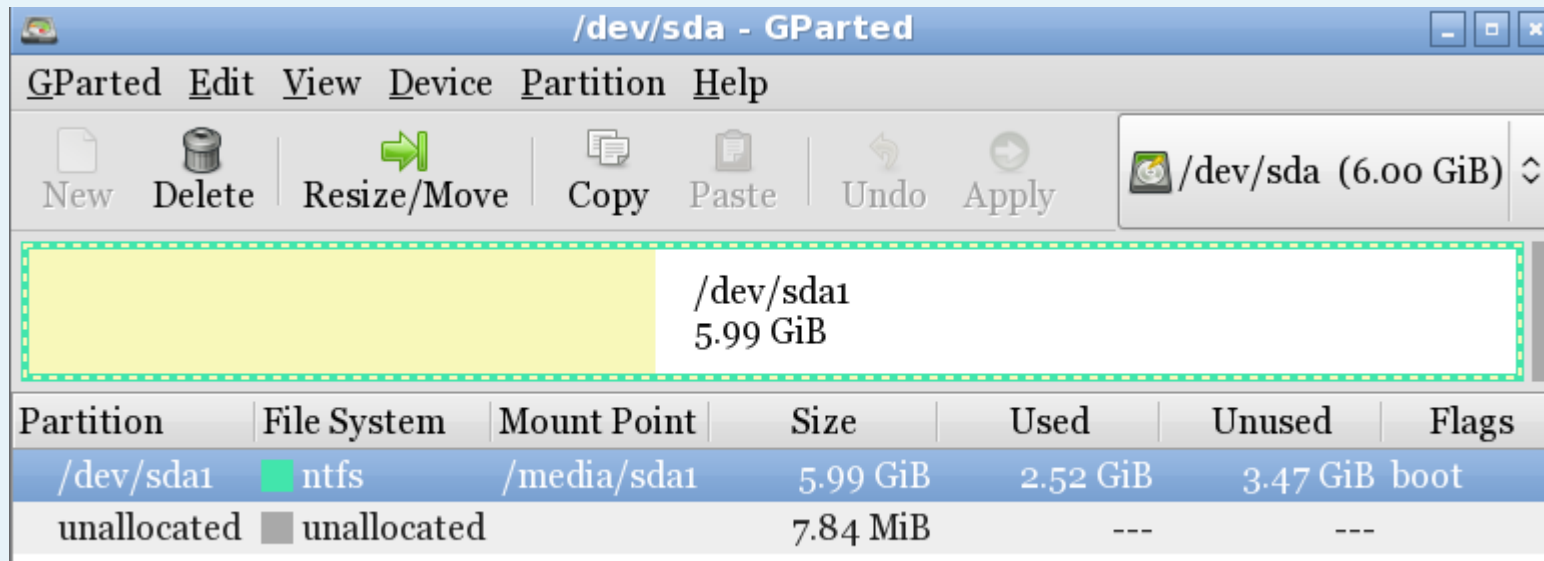
- gpart is an older text utility last updated in 2001.
- gparted is on partedmagic and systemrescue. Trinity only has gpart.

File System Checking and Repair

- fsck for linux and fat filesystems.

- To repair NTFS filesystems you must still run Windows chkdsk. ntfsfix can only perform minor repairs and mark a partition for automatic chkdsk on the next boot.

- testdisk. Misnamed, it finds all partitions. It can also undelete files on ext2 but not ext3 or ext4.

gsmartcontrol

Hard Drives for the last decade have incorporated intelligent self-diagnostics. gsmartcontrol supports all of the major manufacturers' drives.

Previously you had to download a seperate utility from each manufacturer.

gsmartcontrol will perform a short or a long test on a hard drive. I recommend doing a long test whenever redeploying an older hard drive.

GSmartControl

File   Device   Options   Help

/dev/sda, 80.03 GB,

Drive information

Basic health chec

▽ **More**

Model family:

☑ Enable SMART

☑ Enable Auto Offl

Devices

Partition
Editor

Smart
Control

Start
Network

Device Information - /dev/sda: Hitachi HTS541680J9SA00 - GSmartControl

Device: /dev/sda   **Model:** Hitachi HTS541680J9SA00

| Identity | Attributes | Capabilities | Error Log | Self-test Logs | Perform Tests |

Model Family	Hitachi Travelstar 5K160 series
Device Model	Hitachi HTS541680J9SA00
Serial Number	SB2241SGJNWZ1E
Firmware Version	SB2OC70P
User Capacity	80.03 GB [74.53 GiB, 80026361856 bytes]
Is in smartctl database	Yes
ATA Version	7
ATA Standard	ATA/ATAPI-7 T13 1532D revision 1
Scanned on	Tue Nov 3 02:49:20 2009 UTC
SMART supported	Yes
SMART enabled	Yes
Smartctl version	5.38
Overall health self-assessment test	PASSED

| Refresh | View Output | Save As | Close |

GSmartC...   Device In...

File Recovery

- testdisk available on all of the rescue disks can recover deleted files on ext2.

- Forensic utility foremost can be used to recover deleted files from Ext3/4, but it is not on any of the rescue disks.

- grepext3 (on pm but not trk) can be used to recover ext3 deleted files but not ext4.

- My short experiments with grepext3 and foremost did not result in recovering testfile.txt.

File Recovery Continued

- ntfsundelete works on ntfs.

- winpass can be used to reset the local admin password on windows.

- ddrescue can scrape files from disks with bad sectors, but does not recover deleted files.

- At this time there is no easy way to recover deleted files on ext3 or ext4. So much for the advantages of journalling filesystems.

The Dieing Disk

- The best time to recover a failed hard drive is before it fails.

- If gsmartcontrol indicates a disk is having hard errors, even if it still seems to work, back it up and replace it.

- You can use an image program or normal copy to get what you need.

- ddrescue (on pm, trk, and srcd) can recover files from a damaged disk.

The Dieing Disk

- If a dying disk works for a while and then stops working, wrap it in a towel (to protect against condensation) and put it in the fridge (do not freeze unless super desperate, freezing could damage it more).

- Try recovery with the case open and extra fans (make sure they are creating a rational airflow pattern not blowing against each other).

- Conversely some dying disks only work when they're warm. Others if you hit them.

Imaging

- Imaging programs copy an entire hard drive or partition in its entirety and can save an image for later retrieval.

- Clonezilla is on Clonezilla and PartedMagic.

- PartImage is on all of the disks except Clonezilla.

- I've used Clonezilla successfully, its' only failing is with the BCD boot partition. I have not used PartImage.

Boot Loader Recovery

- Boot Loaders are in a pain in the bottom.

- Lilo is no longer maintained.

- grub is being retired and replaced.

- Some distributions have moved to the new grub 2, but most still use grub legacy.

- grub and grub 2 configuration files are not compatible.

Boot Loader Recovery

- Older Microsoft OSes don't have a boot loader and just expect to own the MBR.

- Windows NT, XP and 2000/2003 use NTLDR, which only understands MS OSes

- Windows 2008 and Vista and 7.0 use a new loader, which I will refer to as BCD.

- There is no agreement among boot loader vendors about anything. Except "We want your MBR".

Boot Loader Wars

- When building a multiboot system, choose your preferred bootloader first.

- Install an OS that uses the correct bootloader, last.

- When inevitably something overwrites your boot loader have a recovery strategy.

- On Linux/BSD whichever loader a distribution is using (grub/grub2/lilo), it is likely that the desired one is available, so you can switch to the correct loader and repair from the bootable system.

Recovering Grub

- I recommend selecting grub or grub 2 as your loader, either grub is friendlier to foreign OSes than any of the MS Loaders.

- You will need to use a LiveCD/USB to repair grub 2 as rescue disks still only support grub legacy.

- The partedmagic supergrubdisk boot option can be used to repair grub 1.

Recovering GRUB

- In both versions of grub grub-install correctly invoked will set grub back up.

- The configuration file for legacy grub is menu.conf, for grub 2 grub.cfg

- Grub numbers drives beginning with 0

- Sometimes grub's use of volume ids instead of /dev/xxx locations can trip it up, you can safely replace these entries with the /dev/xxx value

Grub

- After editing menu.lst in grub-legacy you need to use the grub shell or the update-grub script to actually get your new menu.

- Grub2 reads grub.cfg on every boot.

- vol_id returns the volume id of the specified partition.

Restoring Proprietary Boot Loaders

- The latest generation MS Boot Loader creates a small hidden partition, to recover it, or recover from an otherwise damaged boot loader you must boot from the OS install CD and choose to obscure selection to repair your computer. It seems like later CDs in the same architecture work but earlier ones do not.

Restoring Proprietary Boot Loaders

- Recovering an MS Bootloader usually breaks grub.

- EasyBCD is a without charge application from neosmart.net which enables BCD to function as a multiOS Bootloader. It requires you to copy your grub configuration to a place readable by Windows because Windows can't read Linux disk formats. You then have to use information from grub's configuration to create the entries.

Closing

- This presentation will be posted at http://www.brainbuz.org/techinfo/rescue.html

- Thank you for supporting the Philadelphia Linux User's Group. http://www.phillylinux.org

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