The glucopy-glurestore system deployment scripts

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Introduction

When you need to make more than one copy of your installed and fine-tuned system in less than a lifetime, these scripts are for you. We have used it to back-up and clone slightly complex working systems. Restoration from data taking up a 700Mb CD takes about ten minutes (current era computers).

History

20061203 – First release: tlgu.carmen.gr
20061223 – EOF correction
20080102 – GRUB syntax correction, distribution-specific considerations

Acknowledgements

Spiros Georgaras (sngeorgaras, otenet gr) for reviewing the scripts and for providing useful checks.

All authors and contributors to the utilities listed below.

References

(use **man** command or **info** command to find out more)

dd

History has it that dd was originally cc (convert and copy) and was renamed to dd as cc stood for c compiler.
It has always been device dump or disk dump for me...

grub

The modularized GRand Unified Bootloader is used in the systems supported by the copy/restore scripts.

An interactive mode allows you options like finding the partitions where the boot loader files reside:

```
find /boot/grub/stage1
```

This will return something like root(hd0,1) which means that grub's root directory was found in the first hdd, second partition.

As long as you have it running, you may then set up the system to boot:

```
setup(hd0)
```

```
quit
```

The setup line indicates where the boot loader will reside (here in the first disk's Master Boot Record - MBR) and the quit command will flush the information to disk.

To boot from interactive mode you must indicate the location of the GNU/Linux system (relative to the hard disk drive used for booting) and the root directory using real device names. For example:

```
kernel /vmlinuz root=/dev/sda2 [additional kernel parameters]
initrd /initrd
boot
```

tar

The venerable tape archive command can be used to easily create compressed or uncompressed archives in forms too numerous to mention here. For added peace of mind compute the **md5sum** of the resulting “tarballs” and compare them to the respective files stored on the backup medium (CD/DVD).

md5sum

Computes a file's checksum or "fingerprint".

sfdisk

A very comprehensive disk partitioner with sector save (-O), dump (-d) and restore options.

mkisofs
cdrecord (now **wodim** - write data to optical disk media)

These utilities can be used to make and burn an ISO CD, optionally including bootable images (-b).

growisofs

Used as a front end to **mkisofs** to make and burn DVD-RW and DVD-RAM images.

Disclaimer

BE CAREFUL! THESE ARE EXAMPLE SCRIPTS AND WILL DEFINITELY NEED ADAPTATION!

TEST USING SAMPLE DATA/HARDWARE BEFORE ACTUAL DEPLOYMENT!

The usual disclaimer about misconfiguring your system beyond repair or oblueterating your work applies: Don't blame it on us. Do one thing at a time.

Make sure you understand the steps involved by reading the respective command manuals. Write to tlgu, carmen gr, in case this document contains inaccuracies, errors or if you have some information that others can benefit from.

The need

The need arose (a rose... a rose!) to install a specific GNU/Linux configuration on a number of identical computer boxes with (almost) blank, unformatted, disks. One option was to blindly clone the disks using **dd** but this would need a significant amount of time, even with a large block size, indeed unjustified, as the sub-Tb disks were mostly empty. Another drawback is that disks should be removed and re-installed. Even with “no-tools” boxes this is an added inconvenience and involves a risk of damaging the hardware.

The solution

We eventually settled on backing-up directories from the GNU/Linux tree by making a compressed **tar** ball (tape archive), copying it onto a CD/DVD and then expanding it onto freshly-formatted partitions. Which means: boot a compact working system on the target machine, clone partitioning information, format selected partitions, untar-uncompress backed-up information, make system bootable and, optionally, run any required customization scripts.

The back-up script

The back-up should (ideally) be made while the system is not running, which usually means that you need to boot with a rescue system disk. A number of suitable floppy, USB or CD-based system images can be downloaded from the net or, better, included in your distribution's boot options. Make sure that this rescue system supports the type of disks in your target system (SATA/SCSI or IDE).

The following script will get partition information in a form that can be used to restore the system on new disks and will then collect the working system files in one (or more) compressed tar balls.

The **sfdisk** program is used for getting partition information (-d option). Take a look at **sys_partitions.txt** after the **glucopy.sh** script has finished.

In this application it is considered that all Master Boot Record (MBR) information will be overwritten by the partitioning and boot loader programs. If you need a copy of all or parts of the MBR, however, **dd** is your friend.

The script must be run by the **root** user, so that all system files can be copied and file attributes preserved. **tar**'s preserve permissions option (-p) is used to that effect.

System directories that contain transient information (e.g. **/proc**, **/sys**) are not copied. Directories or individual files containing unwanted information can be excluded using tar's –exclude=/directory/file option.

```
#!/bin/sh
##############################################################
# glucopy.sh
#
# Creates the /glucopy directory
# Copies partition information in sys_partitions.txt
# Optionally makes a copy of the MBR in mbr.bin
# Copies working GNU/Linux system to .tgz files
#
# USAGE:
# Boot system with a rescue CD or any bootable CD
# that supports your type of disks (SATA/SCSI or IDE).
# run the back-up script: ./glucopy.sh
#
# In this example the system is on /dev/sda
# /dev/sda1 is a small partition with HW manufacturer utilities
# /dev/sda2 has system root (/) -> mounted to /mnt
# /dev/sda3 is a spare (blank) partition
# /dev/sda4 has home (/home) and space to hold
# the information to be copied -> mounted to /mnt2
#
# 061116 jp/dm
##############################################################
# Change the following to reflect the place where your system root (/)
# and the home directories (/home/*) are mounted
mkdir /tmp/mnt1
mkdir /tmp/mnt2
mount /dev/sda2 /tmp/mnt1
mount /dev/sda4 /tmp/mnt2

# The directory to hold the system copy is placed on the larger
partition
mkdir /tmp/mnt2/glucopy

# Change to the working directory
cd /tmp/mnt2/glucopy
```

```
# Optionally copy MBR information
#dd if=/dev/sda of=mbr.bin bs=512 count=1


# Copy partition information
/sbin/sfdisk -d /dev/sda > sys_partitions.txt


# Make tarballs, preserving file permissions (default if run as root)
tar -C /tmp/mnt1 -cpvzf syscopy.tgz boot bin etc lib media opt root
sbin usr var dev


# Move up a level
cd ..
# here we are under the /home directory level
# notice that --exclude will exclude anything that matches a _pattern_
# the glucopy directory will still be created in the tarball
tar -cpvzf ./glucopy/homecopy.tgz * --exclude=glucopy/*


# Copy the backup/restore scripts (here under root /), and the sfdisk
program,  as well
cp /glucopy.sh ./glucopy
cp /glurestore.sh ./glucopy
cp /sbin/sfdisk ./glucopy


# Notify user
echo -e “glucopy: finished \a”
```

CD/DVD preparation

The information in the glucopy directory can be burned onto a CD or DVD using the **mkisofs** and **cdrecord** (**wodim**) or **growisofs** or by using a GUI front end such as **k3b**. You can make the medium bootable by including a suitable system image.

The two example scripts below (**cdmake**, **cdburn**) will make a CD ISO image in the /tmp directory and burn it to a CD. Or you can use the **growisofs** command: to burn CD/DVDs e.g. growisofs /dev/hdc <mkisofs options>

Needless to say, the scripts need to be customized for your own equipment.

```
#########################################################
# Usage: cdmake VOLUME_LABEL DIRECTORY
# Will output /tmp/cdimage.iso
```

```
#
if (test -z $1 -o -z $2); then
        echo Usage: cdmake VOLUME_LABEL TOP_LEVEL_DIRECTORY
else
mkisofs -V $1 -rational-rock -full-iso9660-filenames \
  -iso-level 2 -o /tmp/cdimage.iso  $2
fi
#########################################################
Example: ./cdmake BACK061203 /home/glucopy

#########################################################
# cdburn
cdrecord gracetime=2 -v dev=/dev/hdc -speed=48 -multi -eject
driveropts=burnfree /tmp/cdimage.iso
#########################################################
Example: ./cdburn
```

The restore script

A minimal (or not-so-minimal) system is loaded using a rescue CD/USB/floppy, at which point the restore script is run.

The **glurestore** script will partition the target disk using information obtained from the original system, will format the desired partitions and will then mount the partitions, restore the data, and make the target disk bootable.

Note that **/proc** and **/sys** directories (which were not backed up) need to be created. The **/mnt** directory is created, as well.

System restoration may be followed by any individualization process such as system serialization.

```
#!/bin/sh
#############################################################
# glurestore.sh
#
# USAGE:
# Boot system with a rescue CD or any bootable medium
# that supports your type of disks (SATA/SCSI or IDE).
#
# Mount the medium containing the backed-up files and
# run the restore script:
# e.g. mount /dev/hda /mnt
```

```
#      /mnt/glurestore.sh
#
# In this example the system is on /dev/sda
# and the CD/DVD ROM drive is on /dev/hda
# There are four primary partitions:
# /dev/sda1 contains HW manufacturer utilities and will not be
formatted
# /dev/sda2 will be formatted using ext3 and will hold the system root
(/)
# /dev/sda3 will be formatted using ext3 (but will not be used)
# /dev/sda4 will be formatted using ext3 and will hold /home
#
# 061116 jp/dm
# 080102 dm - note that a space is needed after the GRUB commands
################################################################

# Change to the CD direcory
cd /mnt

# Optionally install Master Boot Record
# (uncomment the following two lines)
#echo "Installing MBR"
#dd if=mbr.bin of=/dev/sda bs=512 count=1

# Create Partitions
# The sfdisk program used has been copied
# on the backup medium.
echo "Creating Partition Table"
./sfdisk /dev/sda < sys_partitions.txt

# Format partitions
# Change to reflect the number of partitions that need
# to be formatted and the type of formatting
echo "Formating Partitions"
mkfs.ext3 /dev/sda2
mkfs.ext3 /dev/sda3
mkfs.ext3 /dev/sda4

# Create directory to mount "/" partition
echo "Creating  directory to mount / partition "
```

```
mkdir /mnt2
mount /dev/sda2 /mnt2

# Create /proc /sys and /mnt directories
echo "Creating  proc, sys and mnt directories "
mkdir /mnt2/proc
mkdir /mnt2/sys
mkdir /mnt2/mnt

# Create directory and mount "home" partition
echo "Creating  directory and mounting home partition "
mkdir /mnt2/home
mount /dev/sda4 /mnt2/home

# Extract files
tar -C /mnt2 -xpvzf syscopy.tgz
tar -C /mnt2 -xpvzf homecopy.tgz

#####################################
# Optional scripts may be placed here
# If you are restoring libraries, chroot/ldconfig may prove useful.
#####################################

# Now make sure that correct boot information
# is present in the hard disk's MBR
# grub is run in batch mode
# hd0,1 is hard disk 0 (first hard disk of any kind), second partition
– for this example
/sbin/grub --batch <<EOF
root (hd0,1)
setup (hd0)
quit
EOF

# Notify user
echo -e “glurestore: finished! \a”

# Reboot and check your new system
reboot
```

Distribution-specific considerations

SuSE disks include a RAM-based rescue system. So does the **Trinity Rescue Kit**, which is completely RAM-based.

Ubuntu, for security reasons, does not have a user named **root**. Login and execute the command **sudo su**, providing the default user's password.

PCLinuxOS has a **copy2ram** boot option that can be used to free the LiveCD drive.

PCLinuxOS employs the **udev** / **iftab** (dynamic device management / interface table) mechanisms to identify and assign persistent names to network interfaces. Of course this is not desirable in the cloning process and the relevant files need to be excluded. This can be done either during back-up (e.g. add a pertinent tar --exclude= xxx in **glucopy**) or the unwanted files can be deleted following restoration. The latter method is used in the **glucopy/glurestore** variants below, used to backup and restore a default **PCLinuxOS** system. These examples include checks for the root user and the existence of the required utilities:

```
#!/bin/sh
################################################################
# glucopy.sh
#
# Creates the /glucopy directory
# Copies partition information in sys_partitions.txt
# Optionally makes a copy of the MBR in mbr.bin
# Copies working GNU/Linux system to .tgz files
#
# USAGE:
# Boot system with a rescue CD or any bootable CD
# that supports your type of disks (SATA/SCSI or IDE).
# run the back-up script: ./glucopy.sh
#
# In this example the system is on /dev/sda
# /dev/sda1 has system root (/) -> mounted to /mnt1
# /dev/sda5 is a spare (blank) partition
# /dev/sda6 has home (/home) and space to hold
# the information to be copied -> mounted to /mnt2
#
# 061116 jp/dm
# 070503 sg - root user and program availability checks
# 071220 dm - pclinuxos default disk layout
```

```
#############################################################
# Change the following to reflect the place where your system root (/)
# and the home directories (/home/*) are mounted

# Check that user is root
USER=`id -un`
if (test $USER != "root");then
        echo "Error: This script must be executed by root"
        exit
fi

# Check availability of programs
TAR=`which tar 2>/dev/null`
if (test -z "$TAR");then
        echo "Error: The program \"tar\" was not found"
        echo "       The live CD you are using does not contain the
program \"tar\"."
        echo "       The backup procedure cannot be executed without
it."
  echo "       Please use another live CD."
  exit
fi
SFDISK=`which sfdisk 2>/dev/null`
if (test -z "$SFDISK");then
        echo "Error: The program \"sfdisk\" was not found"
        echo "       The live CD you are using does not contain the
program \"sfdisk\"."
        echo "       The backup procedure cannot be executed without
it."
        echo "       Please use another live CD."
        exit
fi
THIS_DIR=`pwd`

# Checkpoint
#exit

mkdir /tmp/mnt1
mkdir /tmp/mnt2
mount /dev/sda1 /tmp/mnt1
```

```
mount /dev/sda6 /tmp/mnt2


# The directory to hold the system copy is placed on the larger
partition
mkdir /tmp/mnt2/glucopy


# Change to the working directory
cd /tmp/mnt2/glucopy


# Optionally copy MBR information
#dd if=/dev/sda of=mbr.bin bs=512 count=1
# Copy partition information
"$SFDISK" -d /dev/sda > sys_partitions.txt


# Make tarballs
"$TAR" -C /tmp/mnt1 -cpvzf syscopy.tgz boot bin etc lib media opt root
sbin usr var dev


# Move up a level
cd ..
# here we are under the /home directory level
# notice that --exclude will exclude anything that matches a _pattern_
# the glucopy directory will still be created in the tarball
"$TAR" --exclude=glucopy/* -cpvzf ./glucopy/homecopy.tgz *


# Copy the backup/restore scripts (here under root /), and the sfdisk
program,  as well
cp "$THIS_DIR"/* ./glucopy
#cp /glucopy.sh ./glucopy
#cp /glurestore.sh ./glucopy
cp "$SFDISK" ./glucopy


# Notify user
echo glucopy: finished


////////////////////////////////////////////////////////////////////
//////////////////


#!/bin/sh
################################################################
```

```
# glurestore.sh
#
# USAGE:
# Boot system with a rescue CD or any bootable medium
# that supports your type of disks (SATA/SCSI or IDE).
#
# Mount the medium containing the backed-up files and
# run the restore script:
# e.g. mount /dev/hda /mnt
#      /mnt/glurestore.sh
#
# In this example the system is on /dev/sda
# and the CD/DVD ROM drive is on /dev/hda
# There are four primary partitions:
# /dev/sda1 contains HW manufacturer utilities and will not be
formatted
# /dev/sda2 will be formatted using ext3 and will hold the system root
(/)
# /dev/sda3 will be formatted using ext3 (but will not be used)
# /dev/sda4 will be formatted using ext3 and will hold /home
#
# 061116 jp/dm
# 061223 dm -- EOF correction
# 070503 sg -- root user and program availability checks
# 071220 dm -- remove hard-coded MAC address files (PCLinuxOS)
#################################################################
# Check that user is root
USER=`id -un`
if (test $USER != "root");then
        echo "Error: This script must be executed by root"
        exit
fi

# Check availability of programs
TAR=`which tar 2>/dev/null`
if (test -z "$TAR");then
        echo "Error: The program \"tar\" was not found"
        echo "       The live CD you are using does not contain the
program \"tar\"."
        echo "       The backup procedure cannot be executed without
```

```
it."
  echo "       Please use another live CD."
  exit
fi
SFDISK=`which sfdisk 2>/dev/null`
if (test -z "$SFDISK");then
        echo "Error: The program \"sfdisk\" was not found"
        echo "       The live CD you are using does not contain the
program \"sfdisk\"."
        echo "       The backup procedure cannot be executed without
it."
        echo "       Please use another live CD."
        exit
fi
GRUB=`which grub 2>/dev/null`
if (test -z "$GRUB");then
        echo "Error: The program \"grub\" was not found"
        echo "       The live CD you are using does not contain the
program \"sfdisk\"."
        echo "       The backup procedure cannot be executed without
it."
        echo "       Please use another live CD."
        exit
fi
MKEXT3=`which mkfs.ext3 2>/dev/null`
if (test -z "$MKEXT3");then
        echo "Error: The program \"mkfs.ext3\" was not found"
        echo "       The live CD you are using does not contain the
program \"sfdisk\"."
        echo "       The backup procedure cannot be executed without
it."
        echo "       Please use another live CD."
        exit
fi

THIS_DIR=`pwd`

# Checkpoint
#exit

# Change to the CD direcory
```

```
cd /mnt/cdrom

# Optionally install Master Boot Record
# (uncomment the following two lines)
#echo "Installing MBR"
#dd if=mbr.bin of=/dev/sda bs=512 count=1

# Create Partitions
# The sfdisk program used has been copied
# on the backup medium.
echo "Creating Partition Table"
"$SFDISK" /dev/sda < sys_partitions.txt

# Format partitions
# Change to reflect the number of partitions that need
# to be formatted and the type of formatting
echo "Formating Partitions"
"$MKEXT3" /dev/sda1
"$MKEXT3" /dev/sda5
"$MKEXT3" /dev/sda6

# Create directory to mount "/" partition
echo "Creating  directory to mount / partition "
mkdir /mnt2
mount /dev/sda1 /mnt2

# Create /proc /sys and /mnt directories
echo "Creating  proc, sys and mnt directories "
mkdir /mnt2/proc
mkdir /mnt2/sys
mkdir /mnt2/mnt

# Create directory and mount "home" partition
echo "Creating  directory and mounting home partition "
mkdir /mnt2/home
mount /dev/sda6 /mnt2/home

# Extract files
"$TAR" -C /mnt2 -xpvzf syscopy.tgz
```

```
"$TAR" -C /mnt2/home -xpvzf homecopy.tgz

####################################
# Optional scripts may be placed here
# If you are restoring libraries, chroot/ldconfig may prove useful.
####################################

rm /mnt2/etc/iftab
rm /mnt2/etc/udev/rules.d/61-net_config.rules
rm /mnt2/root/.bash_history
rm /mnt2/home/ats/.bash_history

# Now make sure that correct boot information
# is present in the hard disk's MBR
# grub is run in batch mode
# hd0,0 is hard disk 0 (first hard disk of any kind), first partition
– for this example
"$GRUB" --batch <<EOF
root (hd0,0)
setup (hd0)
quit
EOF

# Notify user
echo glurestore: finished!

reboot
```

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