

mkg

1.0

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Chapter 1

Usage

In a nutshell

```
./mkg [command=argument] ... [command=argument] [file.iso]
```

See [Wiki](#) for details.

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Chapter 2

Bug List

Global `create_vm` (VM)

VB bug note Unfortunately

Global `partition` ()

Same issue with `mkswap` and `swapon`. Cleaning VBox config/settings, syncing and a bit of sleep fixed these issues for the *net-setup* method.

However if vm type is *'headless'* the *dhcpcd* method is consistently hampered by a VBox bug, which is tentatively circumvented by sending a `controlvm keyboardputscancode 1c` instruction. Tests show that this is linked to a requested user keyboard or mouse input by the Gentoo minimal install CD. This cannot be simulated owing to the lack of `/dev/uinput`. The reason why user input is requested has not been found. Without it, `/dev/sda2` and/or `sda4` are mistakenly identified as being mounted and/or busy, while this cannot be the case. With even a single keystroke for a `readcommand`, all falls back into place. This is why using the *net-setup* script, which forces user input, circumvents the issue. This may be caused by an aging kernel and/or incompatibilities with virtualization. Using a CloneZilla CD as a replacement solved the issue completely. It might be better to use a beefed-up Gentoo install CD.

Chapter 3

Todo List

Global `adjust_environment ()`

Add more regional options by parametrization of commandline

Global `create_vm (VM)`

Find a way to only compact on success and never on failure of VM.

Global `install_software ()`

Add a script to build R dependencies

Global `main ()`

Daemonize the part below `generate_Gentoo` when `#VMTYPE` is `headless` so that the script can be detached completely with `nohup mkgentoo.. &`

Chapter 4

Module Index

4.1 Modules

Here is a list of all modules:

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5.1 File List

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Chapter 6

Module Documentation

6.1 Create Gentoo linux image and installer.

Functions

- [build_virtualbox](#) ()
Build VirtualBox from source using an unsquashed clonezilla CD as a chrooted environment.
- [help_md](#) ()
Print usage in markdown format.
- [help_](#) ()
Print usage to stdout.
- [manpage](#) ()
Print help to man page.
- [htmlpage](#) ()
Print help to html page.
- [pdfpage](#) ()
Print help to pdf page.
- [validate_option](#) (option)
Check if argument is part of array [ARR](#) as a legitimate commandline option.
- [get_options](#) ()
Parse command line.
- [test_cli_pre](#) ()
Check VirtualBox version and prepare commandline analysis.
- [test_cli](#) (cli)
Analyse commandline.
- [test_cli_post](#) ()
Check commandline coherence and incompatibilities.
- [run_docker_container](#) ()
Run the downloaded Docker image.
- [mount_live_cd](#) ()
Mount Gentoo/Clonezilla live CD and unsquashfs the GNU/linux system.
- [make_boot_from_livecd](#) ()
Tweak the Gentoo minimal install CD so that the custom- made shell scripts and stage3 archive are included into the squashfs filesystem.
- [test_vm_running](#) (vm)
Check if VM as first named argument exists and is running.

- [deep_clean](#) ()
Force-clean root VirtualBox registry.
- [delete_vm](#) (vm, ext, mode)
Powers off, possibly with emergency stop, the VM names as first argument.
- [create_vm](#) (VM)
Create main VirtualBox machine using VBoxManage commandline.
- [log_loop](#) ()
Loop log tags every minute and optionally plot virtual disk size.
- [create_iso_vm](#) ()
*Create the new VirtualBox machine aimed at converting the VDI virtualdisk containing the Gentoo Linux distribution into an XZ-compressed clonezilla image uneder **ISOFILES/home/partimag/image**.*
- [clone_vm_to_device](#) (mode)
Directly clone Gentoo VM to USB stick (or any using block device)
- [create_device_system](#) (Mode)
Clone VDI virtual disk to external device (USB device or hard drive)
- [clonezilla_to_iso](#) (iso, dir)
Create Gentoo linux clonezilla ISO installer out of a clonezilla directory structure and an clonezilla image.
- [add_guest_additions_to_clonezilla_iso](#) ()
*Download clonezilla ISO or recover it from cache calling [fetch_process_clonezilla_iso](#).
Upgrade it with virtualbox guest additions.*
- [bind_mount_clonezilla_iso](#) ()
Fetches the clonezilla ISO. mount it to mnt, rsync it to mnt2 and ISOFILES bind-mount mnt2 live filesystem after unsquashfs.
- [unmount_clonezilla_iso](#) ()
Unmount the clonezilla filesystem after exiting chroot. Restore the squashfs filesystem.
- [clonezilla_device_to_image](#) ()
Create CloneZilla xz-compressed image out of an external block device (like a USB stick)
- [prepare_for_iso_vm](#) ()
- [generate_Gentoo](#) ()
Launch routines: fetch install IO, starge3 archive, create VM.
- [main](#) ()
Main function launching routines.

Variables

- Exported String [ISO](#) = "downloaded.iso"
Name of downloaded clonezilla ISO file.
- Exported String [CREATE_ISO](#) = false
Custom name of ISO output. Default value is false Can be reversed by a name of type filename.iso on command line, previously created and reused to burn or dd to device installer.
- Exported String [ARR](#)
global string array of switches and default values

6.1.1 Detailed Description

6.1.2 Function Documentation

6.1.2.1 add_guest_additions_to_clonezilla_iso()

```
add_guest_additions_to_clonezilla_iso ( )
```

Download clonezilla ISO or recover it from cache calling [fetch_process_clonezilla_iso](#).

Upgrade it with virtualbox guest additions.

Chroot into the clonezilla Ubuntu GNU/Linux distribution and runs apt to build kernel modules and install the VirtualBox guest additions ISO image.

Upgrade clonezilla kernel consequently Recreates the squashfs system after exiting chroot. Copy the new **isolinux.cfg** parameter file: automates and silences clonezilla behaviour on disk recovery. Calls [clonezilla_to_iso](#)

Note

Installing the guest additions is a prerequisite to folder sharing between the ISO VM and the host. Folder sharing is necessary to recover a compressed clonezilla image of the VDI virtual disk into the directory ISOFILES/home/partimag/image

Definition at line 2276 of file mkgentoo.sh.

6.1.2.2 bind_mount_clonezilla_iso()

```
bind_mount_clonezilla_iso ( )
```

Fetches the clonezilla ISO. mount it to mnt, rsync it to mnt2 and ISOFILES bind-mount mnt2 live filesystem after unsquashfs.

Definition at line 2347 of file mkgentoo.sh.

6.1.2.3 build_virtualbox()

```
build_virtualbox ( )
```

Build VirtualBox from source using an unsquashed clonezilla CD as a chrooted environment.

Build scripts are copied from **clonezilla/build**

Definition at line 30 of file build_virtualbox.sh.

6.1.2.4 clone_vm_to_device()

```
clone_vm_to_device (
    mode )
```

Directly clone Gentoo VM to USB stick (or any using block device)

Parameters

<i>mode</i>	Either "qemu" or "guestfish"
-------------	------------------------------

Definition at line 2143 of file mkgentoo.sh.

6.1.2.5 clonezilla_device_to_image()

```
clonezilla_device_to_image ( )
```

Create CloneZilla xz-compressed image out of an external block device (like a USB stick)

Image is created under ISOFILES/home/partimag/image under VMPATH

Return values

<i>0</i>	on success otherwise exits -1 on failure
----------	--

Definition at line 2418 of file mkgentoo.sh.

6.1.2.6 clonezilla_to_iso()

```
clonezilla_to_iso (
    iso ,
    dir )
```

Create Gentoo linux clonezilla ISO installer out of a clonezilla directory structure and an clonezilla image.

Parameters

<i>iso</i>	ISO output
<i>dir</i>	Directory to be transformed into ISO output

Note

ISO can be burned to DVD or used to create a bootable USB stick using dd on *nix platforms or Rufus (on Windows).

Definition at line 2226 of file mkgentoo.sh.

6.1.2.7 create_device_system()

```
create_device_system (
    Mode )
```

Clone VDI virtual disk to external device (USB device or hard drive)

Two options are available, qemu or guestfish.

Parameters

<i>Mode</i>	Mode must be qemu or guestfish.
-------------	---------------------------------

Return values

<i>0</i>	on success, 1 on error.
----------	-------------------------

Note

Requires **hot_install** on command line to be activated as a security confirmation. This function performs what a live CD does to a target disk, yet using the currently running operating system.

Definition at line 2196 of file mkgentoo.sh.

6.1.2.8 create_iso_vm()

```
create_iso_vm ( )
```

Create the new VirtualBox machine aimed at converting the VDI virtualdisk containing the Gentoo Linux distribution into an XZ-compressed clonezilla image uneder **ISOFILES/home/partimag/image**.

Register machine, create VDI drive, create IDE drive attach disks to controlers
Attach newly augmented clonezilla LiveCD to IDE controller.
Wait for the VM to complete its task. Check that it is still running every minute.

Note

VM may be visible (vm type=gui) or silent (vm type=headless, currently to be fixed). Wait for the VM to complete task.
A new VM is necessary as the first VM used to build the Gentoo filesystem does not contain clonezilla or the VirtualBox guest additions (requested for sharing folders with host). Calls [add_guest_additions_to_clonezilla_iso](#) to satisfy these requirements.

Warning

the **sharedfolder** command may fail with older version of VirtualBox or not be implemented. It is transient, so it disappears on shutdown and requests prior startup of VM to be activated.

Definition at line 1806 of file mkgentoo.sh.

6.1.2.9 create_vm()

```
create_vm (
    VM )
```

Create main VirtualBox machine using VBoxManage commandline.

- Register machine, create VDI drive, create IDE drive attach disks to controllers
- Attach augmented clonezilla LiveCD to IDE controller.
- Wait for the VM to complete its task. Check that it is still running every minute.
- Finally compact it.

Parameters

VM	Name of the virtual machine.
----	------------------------------

Note

VM may be visible (vm type=gui) or without GUI (vm type=headless, currently to be fixed)

Bug VB bug note Unfortunately

```
VBoxManage modifyvm --cpu-profile host @encode
is not fail-safe.
For example, this option detects my CPU (Intel core-i7 5820K) vendor,
model name, number of cpus etc. yet the list of flags is erroneous
and does not contain flags **fma, bmi, bmi2** necessary to compile with
@code -march=haswell
```

. The guest **/proc/cpuinfo** lacks these flags, which are listed in the host **/proc/cpuinfo**, so the VB flag import capability is buggy or incomplete. Borrowing partial solution from: <https://superuser.com/questions/625648/virtualbox-how-to-force-a-specific-cpu-to-the-guest> This added code does not unfortunately enables -march=haswell (+)

Todo Find a way to only compact on success and never on failure of VM.

Definition at line 1536 of file mkgentoo.sh.

6.1.2.10 deep_clean()

```
deep_clean ( )
```

Force-clean root VirtualBox registry.

Definition at line 1366 of file mkgentoo.sh.

6.1.2.11 delete_vm()

```
delete_vm (
    vm ,
    ext ,
    mode )
```

Powers off, possibly with emergency stop, the VM names as first argument.

Parameters

<i>vm</i>	VM name
<i>ext</i>	virtual disk extension, without dot (defaults to "vdi").
<i>mode</i>	"" for standard VM or "ISO_STAGE" for ISO-creating VM.

- Unregisters it
- Deletes its folder structure and hard drive (default is "vdi" as a second argument)

Return values

<i>Returns</i>	0 if Directory and hard drive could be erased, otherwise the OR value of both erasing commands
----------------	--

Definition at line 1423 of file mkgentoo.sh.

6.1.2.12 generate_Gentoo()

```
generate_Gentoo ( )
```

Launch routines: fetch install IO, starge3 archive, create VM.

Definition at line 2603 of file mkgentoo.sh.

6.1.2.13 get_options()

```
get_options ( )
```

Parse command line.

Definition at line 302 of file mkgentoo.sh.

6.1.2.14 help_()

```
help_ ( )
```

Print usage to stdout.

Definition at line 247 of file mkgentoo.sh.

6.1.2.15 help_md()

```
help_md ( )
```

Print usage in markdown format.

Note

white space at end of echoes is there for markdown in post-processing

Definition at line 124 of file mkgentoo.sh.

6.1.2.16 htmlpage()

```
htmlpage ( )
```

Print help to html page.

Definition at line 264 of file mkgentoo.sh.

6.1.2.17 log_loop()

```
log_loop ( )
```

Loop log tags every minute and optionally plot virtual disk size.

Customizable suing options: plot_color, plot_period, plot_position, plot_pause, plot_span

Definition at line 1730 of file mkgentoo.sh.

6.1.2.18 main()

```
main ( )
```

Main function launching routines.

Todo Daemonize the part below generate_Gentoo when #VMTYPE is `headless` so that the script can be detached completely with `nohup mkgentoo.. &`

Definition at line 2691 of file mkgentoo.sh.

6.1.2.19 make_boot_from_livecd()

```
make_boot_from_livecd ( )
```

Tweak the Gentoo minimal install CD so that the custom- made shell scripts and stage3 archive are included into the squashfs filesystem.

This function is returned from early if

```
create_squashfs=false
```

is given on commandline.

Note

Will be run in the \${VM} virtual machine

Return values

<i>Returns</i>	0 on success or -1 on failure.
----------------	--------------------------------

Definition at line 1249 of file mkgentoo.sh.

6.1.2.20 manpage()

```
manpage ( )
```

Print help to man page.

Definition at line 255 of file mkgentoo.sh.

6.1.2.21 mount_live_cd()

```
mount_live_cd ( )
```

Mount Gentoo/Clonezilla live CD and unsquashfs the GNU/linux system.

Note

live CD is mounted under \$VMPATH/mnt and rsync'd to \$VMPATH/mnt2

Definition at line 921 of file mkgentoo.sh.

6.1.2.22 pdfpage()

```
pdfpage ( )
```

Print help to pdf page.

Definition at line 273 of file mkgentoo.sh.

6.1.2.23 prepare_for_iso_vm()

```
prepare_for_iso_vm ( )
```

Short version of [add_guest_additions_to_clonezilla_iso](#) when the ISO has already been pre-authored.

Note

Installing the guest additions is a prerequisite to folder sharing between the ISO VM and the host. Folder sharing is necessary to recover a compressed clonezilla image of the VDI virtual disk into the directory ISOFILES/home/partimag/image

Definition at line 2521 of file mkgentoo.sh.

6.1.2.24 run_docker_container()

```
run_docker_container ( )
```

Run the downloaded Docker image.

- Run the MKG command line within the container.

Warning

Needs administrative rights to load the image.

Return values

<i>The</i>	Docker ID of the container started by <code>docker run</code>
------------	--

Definition at line 845 of file mkgentoo.sh.

6.1.2.25 test_cli()

```
test_cli (
    cli )
```

Analyse commandline.

Parameters

<i>cli</i>	Commandline
------------	-------------

- Create globals of the form VAR=arg when there is var=arg on commandline
- Otherwise assign default values VAR=defaults (3rd argument in array [ARR](#))
- Also checks type of argument against types described for [ARR](#)

Definition at line 467 of file mkgentoo.sh.

6.1.2.26 test_cli_post()

```
test_cli_post ( )
```

Check commanline coherence and incompatibilities.

Return values

0	or exit 1 on incompatibilities
---	--------------------------------

Definition at line 621 of file mkgentoo.sh.

6.1.2.27 test_cli_pre()

```
test_cli_pre ( )
```

Check VirtualBox version and prepare commandline analysis.

Return values

0	otherwise exit 1 if VirtualBox is too old
---	---

Definition at line 374 of file mkgentoo.sh.

6.1.2.28 test_vm_running()

```
test_vm_running (
    vm )
```

Check if VM as first named argument exists and is running.

Parameters

vm	VM name or UUID
----	-----------------

Return values

<i>Returns</i>	0 on success and 1 if VM is not listed or not running
----------------	---

Definition at line 1356 of file mkgentoo.sh.

6.1.2.29 unmount_clonezilla_iso()

```
unmount_clonezilla_iso ( )
```

Unmount the clonezilla filesystem after exiting chroot. Restore the squashfs filesystem.

Definition at line 2396 of file mkgentoo.sh.

6.1.2.30 validate_option()

```
validate_option (
    option )
```

Check if argument is part of array [ARR](#) as a legitimate commandline option.

Parameters

<i>option</i>	String of option.
---------------	-------------------

Returns

true if legitimate option otherwise false.

Definition at line 289 of file mkgentoo.sh.

6.1.3 Variable Documentation

6.1.3.1 ARR

ARR

global string array of switches and default values

Structure is as follows:

```
{{"Commandline option", "Description", "Default value", "Type"}, {...},...}
```

'Type' is among the following values:

- **b** Boolean, 'false' or 'true'
- **d** An existing directory
- **e** Email address: regexp "[a-z]+@[a-z]+\.[a-z]+"
- **f** An existing file
- **n** Numeric value
- **o** 'on' or 'off', a VBoxManage custom Boolean
- **s** Non-empty string. Corresponding defaults may be empty however. This is the notably case for passwords. For such options, explicit commandline value after '=' is requested.
- **u** Url
- **x:y** Conditional type x: one of the above, with [-z "\$x"] <=> { ["\$y" = "false"] || [-z "\$y"]; } && ["\$y" != "true"]
- **vm** Restricted to the `vm` option: can be set to `@ code false` to bypass OS building and only perform burning/external device operations. A double-entry array will be simulated using indexes.

Note

`debug_mode` should be place up front in the array

Definition at line 81 of file utils.sh.

6.1.3.2 CREATE_ISO

```
Exported String CREATE_ISO = false
```

Custom name of ISO output. Default value is false Can be reversed by a name of type filename.iso on command line, previously created and reused to burn or dd to device installer.

Definition at line 113 of file mkgentoo.sh.

6.1.3.3 ISO

```
ISO = "downloaded.iso"
```

Name of downloaded clonezilla ISO file.

Definition at line 105 of file mkgentoo.sh.

6.2 Create Gentoo linux filesystem on VM disk

Functions

- [setup_network](#) ()
Call net-setup and dhcpcd to enable networking.
- [partition](#) ()
*Create partition table, **/dev/sda1** (bios_grub), **/dev/sda2** (boot), **dev/sda3** (swap) and **/dev/sda4** (system)*
- [install_stage3](#) ()
- [finalize](#) ()
Unmount chrooted system, restore user rights and shutdown VM.
- [adjust_environment](#) ()
- [build_kernel](#) ()
— PATCH —
- [install_software](#) ()
- [global_config](#) ()

6.2.1 Detailed Description

and emerge software.

6.2.2 Function Documentation

6.2.2.1 `adjust_environment()`

```
adjust_environment ( )
```

- Set **/etc/fstab**, sync portage tree, select desktop profile
- Set a set of per-package use files and keywords
- Oneshot emerge of **cmake** and **lz4**, prerequisites to `world` update.
- Update `world` . Log into `emerge.build`. Exit on error.
- Set keymaps, localization and time

Todo Add more regional options by parametrization of commandline

Return values

-1	on error at <code>emerge</code> stage.
----	--

Definition at line 40 of file `mkvm_chroot.sh`.

6.2.2.2 `build_kernel()`

```
build_kernel ( )
```

— PATCH —

— End of patch —

- Emerge **gentoo-sources**, **genkernel**, **pciutils** and **linux-firmware**
- Mount `/dev/sda2` to `/boot/`
- Build kernel and `initramfs`. Log into `kernel.log`.

Return values

-1	on error.
----	-----------

Definition at line 229 of file `mkvm_chroot.sh`.

6.2.2.3 `finalize()`

```
finalize ( )
```

Unmount chrooted system, restore user rights and shutdown VM.

- Cleanup `.bashrc`
- Cleanup other files except for logs if debug mode is on.
- Write zeros as much as possible to prepare for compacting.

Definition at line 319 of file `mkvm.sh`.

6.2.2.4 `global_config()`

`global_config ()`

- Cleanup log, distfiles (for deployment), kernel build sources and objects
- Log this into **log_uninstall_software**
- Update **eix** cache. Sets display for **display-manager**.
- Add services: **syslog**, **crone**, **display-manager**, **dbus**, **elogind**
- Substitute **NetworkManager** to temporary networking setup.
- Adjust group and **sudo** settings for non-root user and **sddm**
- Install **grub** in EFI mode.
- Set passwords for root and non-root user.

Warning

Fix **sddm** startup keyboard issue using `setxkbmap`

Definition at line 375 of file `mkvm_chroot.sh`.

6.2.2.5 `install_software()`

`install_software ()`

- Emerge list of ebuids on top of stage3 and system utils already merged.
- Optionally download and build RStudio

Return values

-1	on building errors
----	--------------------

Todo Add a script to build R dependencies

Definition at line 290 of file `mkvm_chroot.sh`.

6.2.2.6 install_stage3()

```
install_stage3 ( )
```

- Copy stage3 archive, ebuild list, kernel config and [mkvm_chroot.sh](#) to /mnt/gentoo
- Extract it, fix basic make.conf options
- Install repos.conf from liveCD (networking parameters)
- Mount liveCD proc/sys/dev files into new filesystem
- On failure, print error codes into file **partition**
- On success, create empty file **partition**
- `chroot` into new system

Definition at line 181 of file mkvm.sh.

6.2.2.7 partition()

```
partition ( )
```

Create partition table, **/dev/sda1** (bios_grub), **/dev/sda2** (boot), **dev/sda3** (swap) and **/dev/sda4** (system)

Create file **partition**.

On error, fill this file with successive exit codes of commands and exit.

On success, just create empty file.

Warning

The VM needs time to recognize **/dev/sda** in some cases, for unclear reasons. This may be a kernel issue or a VirtualBox issue.

Bug Same issue with mkswap and swapon. Cleaning VBox config/settings, syncing and a bit of sleep fixed these issues for the *net-setup* method.

However if vm type is *'headless'* the *dhcpcd* method is consistently hampered by a VBox bug, which is tentatively circumvented by sending a `controlvm keyboardputscancode 1c` instruction. Tests show that this is linked to a requested user keyboard or mouse input by the Gentoo minimal install CD. This cannot be simulated owing to the lack of **/dev/uinput**. The reason why user input is requested has not been found. Without it, **/dev/sda2** and/or **sda4** are mistakenly identified as being mounted and/or busy, while this cannot be the case. With even a single keystroke for a `readcommand`, all falls back into place. This is why using the *net-setup* script, which forces user input, circumvents the issue. This may be caused by an aging kernel and/or incompatibilities with virtualization. Using a CloneZilla CD as a replacement solved the issue completely. It might be better to use a beefed-up Gentoo install CD.

Note

It might be necessary with older machines to increase the amount of sleep.

Definition at line 95 of file mkvm.sh.

6.2.2.8 setup_network()

```
setup_network ( )
```

Call net-setup and dhcpcd to enable networking.

Create file **setup_network** on success for debugging purposes

Return values

<i>Otherwise</i>	exit 1 on failure
------------------	-------------------

Definition at line 29 of file mkvm.sh.

6.3 Auxiliary functions to check

Functions

- declare `i` `ARRAY_LENGTH` `create_options_array` ()
*Read file **options** into a temporary array A which will contain command line specifications.*
- `test_numeric` (number)
Test whether the input value is numeric.
- `test_URL` (Internet)
Test whether the input value is a valid URL.
- `send_mail` ()
Send an email to \$EMAIL at \$SMTP_URL to warn about end of processing.
- `recreate_liveCD_ISO` (dir)
Create ISO of liveCD out of directory.
- `burn_iso` ()
*Burn Gentoo clonezilla installer to DVD using **cdrecord**.*
- `create_install_ext_device` ()
Create USB-stick (or any external device) Gentoo clonezilla installer.
- `check_dir` ()
Checks existence of directories.
- `check_file` ()
Checks existence of file.
- `check_files` ()
Checks existence of files.
- `check_tool` ()
Checks existence of auxiliary tools.
- `if_fails` ()
Echoes a message and exit in case of previous command failure.
- `cleanup` ()
Clean up all temporary files and directpries (except for VirtualBox build)
- `bind_filesystem` (root)
Bind-mounts the host live filesystem (proc/sys/dev/run) to a future chrooted OS-like tree of similar nature.

6.3.1 Detailed Description

lines, files, devices and burn disk.

6.3.2 Function Documentation

6.3.2.1 `bind_filesystem()`

```
bind_filesystem (
    root )
```

Bind-mounts the host live filesystem (proc/sys/dev/run) to a future chrooted OS-like tree of similar nature.

Parameters

<i>root</i>	Root directory of the subordinate filesystem.
-------------	---

Definition at line 503 of file utils.sh.

6.3.2.2 burn_iso()

```
burn_iso ( )
```

Burn Gentoo clonezilla installer to DVD using **cdrecord**.

Note

cdrecord should have been installed beforehand

Return values

<i>Return</i>	cdrecord return code
---------------	-----------------------------

Definition at line 294 of file utils.sh.

6.3.2.3 check_dir()

```
check_dir ( )
```

Checks existence of directories.

Parameters

<i>dirs</i>	Successive paths (relative or absolute) to directories.
-------------	---

Warning

Paths should be separated by spaces and quoted.

Return values

<i>Undefined</i>	or exit 2 if string is not a directory path
------------------	---

Definition at line 372 of file utils.sh.

6.3.2.4 `check_file()`

```
check_file ( )
```

Checks existence of file.

Parameters

<i>filepath</i>	Relative or absolute path to file to be checked for existence.
<i>msgs</i>	Successive message strings to be echoed if file not found.

Warning

Paths should be separated by spaces and quoted.

Return values

<i>Undefined</i>	or exit 3 if string is not a file path
------------------	--

Definition at line 393 of file `utils.sh`.

6.3.2.5 `check_files()`

```
check_files ( )
```

Checks existence of files.

Parameters

<i>files</i>	Successive paths (relative or absolute) to files.
--------------	---

Warning

Paths should be separated by spaces and quoted.

Return values

<i>Undefined</i>	or exit 3 if any string is not a file path
------------------	--

Definition at line 413 of file `utils.sh`.

6.3.2.6 `check_tool()`

```
check_tool ( )
```

Checks existence of auxiliary tools.

Parameters

<i>dirs</i>	Successive paths (relative or absolute) to helper binaries.
-------------	---

Warning

Paths should be separated by spaces and quoted.

Return values

<i>Undefined</i>	or exit 1 if binary not found.
------------------	--------------------------------

Definition at line 432 of file utils.sh.

6.3.2.7 cleanup()

```
cleanup ( )
```

Clean up all temporary files and directpries (except for VirtualBox build)

Needs

```
CLEANUP=true
```

```
. If
```

```
FULL_CLEANUP=true
```

then erase ISO files with names containing **clonezilla**, **install** or **downloaded** names.

Definition at line 474 of file utils.sh.

6.3.2.8 create_install_ext_device()

```
create_install_ext_device ( )
```

Create USB-stick (or any external device) Gentoo clonezilla installer.

Warning

Use with care, check your EXT_DEVICE variable.

Return values

<i>Return</i>	value of <code>syncexit</code> code
---------------	-------------------------------------

Definition at line 344 of file utils.sh.

6.3.2.9 create_options_array()

```
create_options_array ( )
```

Read file **options** into a temporary array A which will contain command line specifications.

Later on A initializes the read-only array [ARR](#)

Definition at line 71 of file utils.sh.

6.3.2.10 if_fails()

```
if_fails ( )
```

Echoes a message and exit in case of previous command failure.

Parameters

<i>ret</i>	Return value of command to be tested.
<i>msg</i>	... Message(s) to be echoed inc case of a failure.

Note

Command success is presumed to be identified by \$? == 0.

Return values

<i>Undefined</i>	or exit 1 if \$? != 0.
------------------	------------------------

Definition at line 453 of file utils.sh.

6.3.2.11 recreate_liveCD_ISO()

```
recreate_liveCD_ISO (
    dir )
```

Create ISO of liveCD out of directory.

Parameters

<i>dir</i>	Directory containing all files
------------	--------------------------------

Returns

0 on success or exits -1 on failure.

Note

An alternative xorriso solution could be considered

Definition at line 255 of file utils.sh.

6.3.2.12 send_mail()

```
send_mail ( )
```

Send an email to \$EMAIL at \$SMTP_URL to warn about end of processing.

Warning

Email password is entered in clear using \$EMAIL_PASSWD which is not safe if mkg is run on any other platform than the user's own. Use with care in a private context.

Returns

Return value of 'curl' command.

Definition at line 117 of file utils.sh.

6.3.2.13 test_numeric()

```
test_numeric (
    number )
```

Test whether the input value is numeric.

Parameters

<i>number</i>	in string form
---------------	----------------

Returns

grep value against input string

Definition at line 93 of file utils.sh.

6.3.2.14 test_URL()

```
test_URL (
    Internet )
```

Test whether the input value is a valid URL.

Parameters

<i>Internet</i>	URL
-----------------	-----

Returns

grep value against input string

Definition at line 103 of file utils.sh.

Chapter 7

File Documentation

7.1 build_virtualbox.sh File Reference

Functions

- `build_virtualbox ()`

Build VirtualBox from source using an unsquashed clonezilla CD as a chrooted environment.

Variables

- Exported String `DEBIAN_FRONTEND` = noninteractive

7.1.1 Variable Documentation

7.1.1.1 DEBIAN_FRONTEND

Exported String `DEBIAN_FRONTEND` = noninteractive

Definition at line 42 of file `build_virtualbox.sh`.

7.2 fetch_functions.sh File Reference

Functions

- [fetch_gentoo_install_iso](#) ()
Download minimal Gentoo install ISO file and caches it.
- [fetch_clonezilla_iso](#) ()
Download clonezilla ISO file and caches it.
- [cache_uncache_clonezilla_iso](#) ()
Either download clonezilla ISO file and caches it OR uncaches it.
- [fetch_process_clonezilla_iso](#) ()
Download clonezilla ISO file and process it.
- [fetch_preprocessed_gentoo_install](#) ()
Download automatic output of preprocessed_gentoo_install.iso from Github Actions at fabnicol/mkg.git.
- [fetch_clonezilla_with_virtualbox](#) ()
Download automatic output of Github Actions at fabnicol/clonezilla_with_virtualbox.Github.
- [fetch_livecd](#) ()
Downloads Gentoo install CD.
- [fetch_stage3](#) ()
Downloads a fresh stage3 Gentoo archive.
- [fetch_docker_image](#) ()
Download and uncompress an automated Github Actions release of a compressed Docker image to run MKG within.

Variables

- Exported String [LIVECD](#) = `${ISO}`
- Exported String [CLONEZILLACD](#) = `"${clonezilla_iso}"`

7.2.1 Function Documentation

7.2.1.1 cache_uncache_clonezilla_iso()

```
cache_uncache_clonezilla_iso ( )
```

Either download clonezilla ISO file and caches it OR uncaches it.

Definition at line 172 of file fetch_functions.sh.

7.2.1.2 fetch_clonezilla_iso()

```
fetch_clonezilla_iso ( )
```

Download clonezilla ISO file and caches it.

Definition at line 119 of file fetch_functions.sh.

7.2.1.3 fetch_clonezilla_with_virtualbox()

```
fetch_clonezilla_with_virtualbox ( )
```

Download automatic output of Github Actions at [fabnicol/clonezilla_with_virtualbox](https://github.com/fabnicol/clonezilla_with_virtualbox).Github.

Note

URL is: `GITHUB_RELEASE_PATH/releases/download/WORKFLOW_TAG`

Definition at line 314 of file `fetch_functions.sh`.

7.2.1.4 fetch_docker_image()

```
fetch_docker_image ( )
```

Download and uncompress an automated Github Actions release of a compressed Docker image to run MKG within.

- Download from https://github.com/fabnicol/mkg_docker_image/releases/latest
- Uncompress using `xz -d`.
- Load into docker.

Return values

<i>ID</i>	of loaded image.
-----------	------------------

Definition at line 494 of file `fetch_functions.sh`.

7.2.1.5 fetch_gentoo_install_iso()

```
fetch_gentoo_install_iso ( )
```

Download minimal Gentoo install ISO file and caches.q.

Optionaly checks MD5SUMS.

Definition at line 29 of file `fetch_functions.sh`.

7.2.1.6 fetch_livecd()

```
fetch_livecd ( )
```

Downloads Gentoo install CD.

Caches it as `${ISO}`

Return values

<i>Returns</i>	0 on success or -1 on exit
----------------	----------------------------

Definition at line 354 of file fetch_functions.sh.

7.2.1.7 fetch_preprocessed_gentoo_install()

```
fetch_preprocessed_gentoo_install ( )
```

Download automatic output of preprocessed_gentoo_install.iso from Github Actions at [fabnicol/mkg.git](https://github.com/fabnicol/mkg).

Note

URL is: GITHUB_RELEASE_PATH2/WORKFLOW_TAG2

Definition at line 275 of file fetch_functions.sh.

7.2.1.8 fetch_process_clonezilla_iso()

```
fetch_process_clonezilla_iso ( )
```

Download clonezilla ISO file and process it.

- Download iff #DOWNLOAD_CLONEZILLA has value "true"
- Optionnally checks MD5 sum.
- Caches ISO download for later uses.
- Uncaches it if no fresh download.
- Mount ISO download. Copy ro mounted filesystem to rw directory.
- Unsquash ISO filesystem.squashfs.
- Copy clonezilla config file.
- Copy resolv.conf to unsquashed filesystem.

Return values

0	on success or exits -1 on failure.
---	------------------------------------

Definition at line 213 of file fetch_functions.sh.

7.2.1.9 fetch_stage3()

```
fetch_stage3 ( )
```

Downloads a fresh stage3 Gentoo archive.

Caches it as \${STAGE3}

Definition at line 402 of file fetch_functions.sh.

7.2.2 Variable Documentation

7.2.2.1 CLONEZILLACD

```
Exported String CLONEZILLACD = "${clonezilla_iso}"
```

Definition at line 159 of file fetch_functions.sh.

7.2.2.2 LIVECD

```
Exported String LIVECD = ${ISO}
```

Definition at line 103 of file fetch_functions.sh.

7.3 mkgentoo.sh File Reference

Process options, create Gentoo VirtualBox machine and optionally create clonezilla install medium.

Functions

- [help_md](#) ()
Print usage in markdown format.
- [help_](#) ()
Print usage to stdout.
- [manpage](#) ()
Print help to man page.
- [htmlpage](#) ()
Print help to html page.
- [pdfpage](#) ()
Print help to pdf page.
- [validate_option](#) (option)
Check if argument is part of array [ARR](#) as a legitimate commandline option.
- [get_options](#) ()

- Parse command line.*
- [test_cli_pre](#) ()
 - Check VirtualBox version and prepare commandline analysis.*
- [test_cli](#) (cli)
 - Analyse commandline.*
- [test_cli_post](#) ()
 - Check commandline coherence and incompatibilities.*
- [run_docker_container](#) ()
 - Run the downloaded Docker image.*
- [mount_live_cd](#) ()
 - Mount Gentoo/Clonezilla live CD and unsquashfs the GNU/Linux system.*
- [move_auxiliary_files](#) ()
- [make_boot_from_livecd](#) ()
 - Tweak the Gentoo minimal install CD so that the custom- made shell scripts and stage3 archive are included into the squashfs filesystem.*
- [prepare_bash_rc](#) ()
- [test_vm_running](#) (vm)
 - Check if VM as first named argument exists and is running.*
- [deep_clean](#) ()
 - Force-clean root VirtualBox registry.*
- [delete_vm](#) (vm, ext, mode)
 - Powers off, possibly with emergency stop, the VM names as first argument.*
- [create_vm](#) (VM)
 - Create main VirtualBox machine using VBoxManage commandline.*
- [log_loop](#) ()
 - Loop log tags every minute and optionally plot virtual disk size.*
- [create_iso_vm](#) ()
 - Create the new VirtualBox machine aimed at converting the VDI virtualdisk containing the Gentoo Linux distribution into an XZ-compressed clonezilla image under **ISOFILES/home/partimag/image**.*
- [mount_vdi](#) ("w")
 - Use qemu to mount VDI file to host folder.*
- [unmount_vdi](#) (mountpoint)
 - Unmount connection to virtual disk (using qemu) to host folder.*
- [clone_vm_to_device](#) (mode)
 - Directly clone Gentoo VM to USB stick (or any using block device)*
- [create_device_system](#) (Mode)
 - Clone VDI virtual disk to external device (USB device or hard drive)*
- [clonezilla_to_iso](#) (iso, dir)
 - Create Gentoo linux clonezilla ISO installer out of a clonezilla directory structure and an clonezilla image.*
- [add_guest_additions_to_clonezilla_iso](#) ()
 - Download clonezilla ISO or recover it from cache calling [fetch_process_clonezilla_iso](#). Upgrade it with virtualbox guest additions.*
- [bind_mount_clonezilla_iso](#) ()
 - Fetches the clonezilla ISO. mount it to mnt, rsync it to mnt2 and ISOFILES bind-mount mnt2 live filesystem after unsquashfs.*
- [unmount_clonezilla_iso](#) ()
 - Unmount the clonezilla filesystem after exiting chroot. Restore the squashfs filesystem.*
- [clonezilla_device_to_image](#) ()
 - Create CloneZilla xz-compressed image out of an external block device (like a USB stick)*
- [prepare_for_iso_vm](#) ()
- [generate_Gentoo](#) ()
 - Launch routines: fetch install IO, stage3 archive, create VM.*
- [main](#) ()
 - Main function launching routines.*

Variables

- Exported String `ISO` = "downloaded.iso"
Name of downloaded clonezilla ISO file.
- Exported String `CREATE_ISO` = false
Custom name of ISO output. Default value is false Can be reversed by a name of type filename.iso on command line, previously created and reused to burn or dd to device installer.
- Integer `i`
- Exported String `LOG`
- Exported String `ISOLINUX_DIR` = isolinux
— PATCH —
- Exported String `PATH` = "\${PATH}":"\${VBPATH}"
- Exported String `CLI_PULL` = \$(sed -r 's/(.*)pull=true(.*)\1\2/g' <<< "\$@")
- Exported String `SHARE_ROOT`
- Exported String `SHARED_DIR`

7.3.1 Detailed Description

Process options, create Gentoo VirtualBox machine and optionally create clonezilla install medium.

Author

Fabrice Nicol fabrnicol@gmail.com

Copyright

GPL v.3

Note

This file is not included into the clonezilla ISO liveCD.

USAGE

```
mkg [[switch=argument]...] filename.iso [1]
mkg [[switch=argument]...] [2]
mkg help[=md] [3]
```

Usage [1] creates a bootable ISO output file with a current Gentoo distribution.

Usage [2] creates a VirtualBox VDI dynamic disk and a virtual machine with name Gentoo.

Usage [3] prints this help, in markdown form if argument 'md' is specified.

Run:

```
mkg help
```

to print a list of possible switches and arguments.

Warning

you should have at least 55 GB of free disk space in the current directory or in `vmpath` if specified. Boolean values are either 'true' or 'false'. An option not followed by '=' is equivalent to **option=true**, except for help and a possible ISO file. For example, to build a minimal: `distribution,specify minimal` or `minimal=true` on command line.

Examples:

- Only create the VM and virtual disk, in debug mode, without R and set new passwords, for a French-language platform. Use 8 cores.

```
mkg vm_language=fr_FR minimal debug_mode ncpus=8
nonroot_user=ken passwd='util!Hx&32F' rootpasswd='Hk_32!_CD' cleanup=false
```
- Create ISO clonezilla image of Gentoo linux, burn it to DVD, create an installed OS on a USB stick whose model label starts with *PNY* and finally create a clonezilla installer on another USB stick mounted under `/media/ken/AA45E`

```
mkgento burn hot_install ext_device="PNY" device_installer
ext_device="Sams" my_gentoo_image.iso
```

7.3.2 Function Documentation**7.3.2.1 mount_vdi()**

```
mount_vdi (
    "w" )
```

Use `qemu` to mount VDI file to host folder.

Parameters

<i>w</i>	for enabling read-write mode, otherwise read-only.
----------	--

Warning

May involve security issues, especially if "w" is enabled.

Note

Uses global variable `${SHARED_ROOT_DIR}`

See also

Guestfish and qemu websites for security issues.

Definition at line 1949 of file `mkgentoo.sh`.

7.3.2.2 move_auxiliary_files()

```
move_auxiliary_files ( )
```

Definition at line 1188 of file mkgentoo.sh.

7.3.2.3 prepare_bash_rc()

```
prepare_bash_rc ( )
```

Prepare the .bashrc file by exporting the environment this will be placed under /root in the VM

Definition at line 1323 of file mkgentoo.sh.

7.3.2.4 unmount_vdi()

```
unmount_vdi (
    mountpoint )
```

Unmount connection to virtual disk (using qemu) to host folder.

Parameters

<i>mountpoint</i>	Optional mountpoint path parameter.
-------------------	-------------------------------------

Note

Uses global variable \${SHARED_ROOT_DIR}

See also

Guestfish and qemu websites for security issues.

Definition at line 2054 of file mkgentoo.sh.

7.3.3 Variable Documentation

7.3.3.1 CLI_PULL

```
Exported String CLI_PULL = $(sed -r 's/(.*)pull=true(.*)/\1\2/g' <<< "$@")
```

Definition at line 2708 of file mkgentoo.sh.

7.3.3.2 i

Integer i

Definition at line 223 of file mkgentoo.sh.

7.3.3.3 ISOLINUX_DIR

Exported String ISOLINUX_DIR = isolinux

— PATCH —

— End of patch —

Definition at line 1117 of file mkgentoo.sh.

7.3.3.4 LOG

Exported String LOG

Definition at line 309 of file mkgentoo.sh.

7.3.3.5 PATH

Exported String PATH = "\${PATH}":"\${VBPATH}"

Definition at line 1538 of file mkgentoo.sh.

7.3.3.6 SHARE_ROOT

Exported String SHARE_ROOT

Definition at line 2806 of file mkgentoo.sh.

7.3.3.7 SHARED_DIR

Exported String SHARED_DIR

Definition at line 2807 of file mkgentoo.sh.

7.4 mkvm.sh File Reference

Functions

- `setup_network ()`
Call net-setup and dhcpcd to enable networking.
- `partition ()`
*Create partition table, **/dev/sda1** (bios_grub), **/dev/sda2** (boot), **dev/sda3** (swap) and **/dev/sda4** (system)*
- `install_stage3 ()`
- `finalize ()`
Unmount chrooted system, restore user rights and shutdown VM.

7.5 mkvm_chroot.sh File Reference

Creating Gentoo filesystem in virtual disk.

Functions

- `adjust_environment ()`
- `build_kernel ()`
— PATCH —
- `install_software ()`
- `global_config ()`
- `finalize ()`

Variables

- Integer `res` = 0

7.5.1 Detailed Description

Creating Gentoo filesystem in virtual disk.

Author

Fabrice Nicol

Copyright

GPL v.3

Note

This file is included into the clonezilla ISO liveCD, then copied to the root of the virtual disk.

7.5.2 Function Documentation

7.5.2.1 finalize()

```
finalize ( )
```

Definition at line 474 of file mkvm_chroot.sh.

7.5.3 Variable Documentation

7.5.3.1 res

```
Integer res = 0
```

Definition at line 517 of file mkvm_chroot.sh.

7.6 run_mount_shared_dir.sh File Reference

Variables

- Exported String `SHARED_ROOT_DIR = "${SHARED_DIR}"`

7.6.1 Variable Documentation

7.6.1.1 SHARED_ROOT_DIR

```
Exported String SHARED_ROOT_DIR = "${SHARED_DIR}"
```

Definition at line 12 of file run_mount_shared_dir.sh.

7.7 utils.sh File Reference

Auxiliary functions.

Functions

- declare `i` `ARRAY_LENGTH` `create_options_array` ()
*Read file **options** into a temporary array *A* which will contain command line specifications.*
- `test_numeric` (number)
Test whether the input value is numeric.
- `test_URL` (Internet)
Test whether the input value is a valid URL.
- `send_mail` ()
Send an email to \$EMAIL at \$SMTP_URL to warn about end of processing.
- `test_cdrecord` ()
- `recreate_liveCD_ISO` (dir)
Create ISO of liveCD out of directory.
- `burn_iso` ()
*Burn Gentoo clonezilla installer to DVD using **cdrecord**.*
- `create_install_ext_device` ()
Create USB-stick (or any external device) Gentoo clonezilla installer.
- `check_dir` ()
Checks existence of directories.
- `check_file` ()
Checks existence of file.
- `check_files` ()
Checks existence of files.
- `check_tool` ()
Checks existence of auxiliary tools.
- `if_fails` ()
Echoes a message and exit in case of previous command failure.
- `cleanup` ()
Clean up all temporary files and directpries (except for VirtualBox build)
- `bind_filesystem` (root)
Bind-mounts the host live filesystem (proc/sys/dev/run) to a future chrooted OS-like tree of similar nature.

Variables

- Exported String `ARR`
global string array of switches and default values
- Exported String `ARRAY_LENGTH`

7.7.1 Detailed Description

Auxiliary functions.

Author

Fabrice Nicol fabrnicol@gmail.com

Copyright

GPL v.3

Note

This file is not included into the clonezilla ISO liveCD.

7.7.2 Function Documentation

7.7.2.1 test_cdrecord()

```
test_cdrecord ( )
```

Definition at line 237 of file utils.sh.

7.7.3 Variable Documentation

7.7.3.1 ARRAY_LENGTH

```
Exported String ARRAY_LENGTH
```

Definition at line 82 of file utils.sh.

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