Negatron
The fun side of electrons

Negatron
Le côté amusant des électrons

负电子
电之有趣的一面

Contents

If you just need to know how to use Negatron, please go directly to the Emulation Management *chapter.*

Overview

After Alan Turing theorised the principles of modern computers in his 1936 paper *On Computable Numbers*, the idea of on-screen games quickly made its way as soon as the very first digital computers were made available to scientists and engineers. But it's not until Nolan Bushnell and Ted Dabney released the coin-operated video game *Computer Space* in 1971 and then *Pong* in 1972 that video gaming became a widespread activity.

Since the mid-1990s, as computers became powerful enough and with the advent of the Internet, more and more emulators have been produced to simulate video games of other platforms on personal computers. Often released for free, most emulators reproduce the behaviour of a single machine, e.g. an arcade game or a console. *MAME* is one of those exceptions, which allows to play most of the video games ever released since 1971 on a single machine.

After reviewing how *MAME* came to be and why *Negatron* was made, the last part of this document explains how to use *Negatron* together with *MAME*.

About MAME

THE ORIGINS

MAME is a multiple arcade machine emulator, originally for MS-DOS, on which Nicola Salmoria began working starting December 24th, 1996, in order to merge several emulators running arcade games based on the same kind of machine units as the original Pac-Man. It was first released on February 5th, 1997 with v0.1. Except during 6 months in 1997, by handing matters to Mirko Buffoni while honouring his military duties, Salmoria successfully led the project until 2003 to become the most versatile emulator, being able to run nearly any kinds of arcade games, helped by a growing team of enthusiasts.

FROM AN ARCADE-ONLY TO A UNIVERSAL EMULATOR

As *MAME* remained focused on arcade machines, some maintainers of the Mac version wanted to use its versatile core to emulate other kinds of machines, them being consoles, computers, calculators, and so on. So *MESS* (Multi Emulator Super System) came into inception with Brad Oliver at its helm, and was first released on June 3rd, 1998. But it's only when the technical hurdle of source code synchronisation with *MAME* was resolved in 1999, with Ben Bruscella as the main coordinator, that *MESS* became a huge side project contributing new features and bug fixes back into *MAME*.

As it made no sense to let those 2 projects go on separately, David Haywood rightly proposed their merging, notably with his *Ultimate MAME / UME* (Universal Machine Emulator) initiative starting November 15th, 2011, with v0.144. This same year, Miodrag Milanović took over the coordinator role of the *MESS* project from Nathan Woods and, the following year, also succeeded Angelo Salese for the same role on the *MAME* side. It led the path to the actual merging of the source code repositories of both projects on August 21st, 2012, despite still being distributed separately. Eventually on May 27th, 2015, both entities had completely merged with v0.162, simply distributed as *MAME*, the all-encompassing machine emulator.

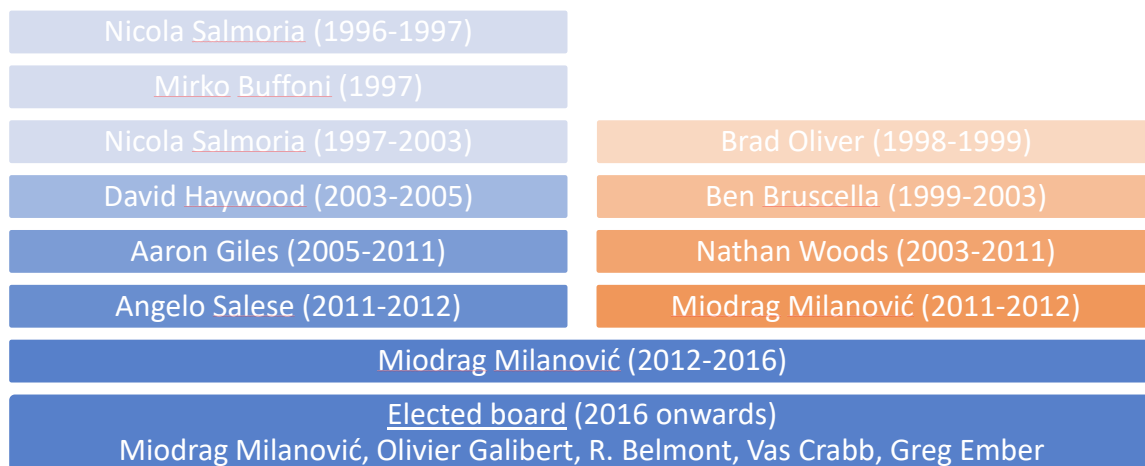| Nicola Salmoria (1996-1997)	
Mirko Buffoni (1997)	
Nicola Salmoria (1997-2003)	Brad Oliver (1998-1999)
David Haywood (2003-2005)	Ben Bruscella (1999-2003)
Aaron Giles (2005-2011)	Nathan Woods (2003-2011)
Angelo Salese (2011-2012)	Miodrag Milanović (2011-2012)
Miodrag Milanović (2012-2016)	
Elected board (2016 onwards) Miodrag Milanović, Olivier Galibert, R. Belmont, Vas Crabb, Greg Ember	

Figure 1 Team coordinators, MAME *and* MESS *sides respectively*

FROM A MS-DOS-ONLY TO A MULTI-PLATFORM EMULATOR

MAME was originally a MS-DOS application. On May 24th, 2001, Windows became the primary development target with v0.37b15. In parallel of the primary target, versions for other OSes were also made available. It was first ported to MacOS as *MacMAME* by John Butler, Aaron Giles and Brad Oliver on February 18th, 1997, and then ported to the various Unix / Linux distributions as *XMAME* by Allard Van Der Bas, Dick the Ridder, Juan Antonio Martinez and Hans de Goede on April 20th, 1997.

But as *MAME* gained in complexity, it became increasingly difficult to synchronise those other OS targets to the Windows version. This issue got solved by Olivier Galibert and R. Belmont (not his real name) by relying on the SDL graphic library. The first public release of *SDLMAME* was made available on June 3rd, 2006 with v0.106u1, and this solution has been integrated into *MAME* since May 15th, 2010 with v0.138, officially making *MAME* a multi-platform application.

FROM A COMMAND LINE TO A GRAPHICAL APPLICATION

The very first port of *MAME* to Windows had been released by Christopher Kirmse on July 17th 1997 as *Mame32*, integrated a first graphical user interface by September 1997, which quickly evolved to its familiar state with the additional works of Michael Soderstrom, Mike Haaland and John Hardy IV. Rebranded as *MameUI* on November 11th, 2007 with v0.120u4, it has set the de-facto standard of design guidelines for most *MAME* dedicated front-ends. Despite this, it has never been integrated into official *MAME*.

So, *MAME* remained a command line application until July 19th, 2007, when Aaron Giles integrated a minimal game selection user interface to v0.117u1, completing the already existing internal UI. But few efforts were dedicated to its maintenance as emulation related options could change dramatically from a version to another, and as the focus clearly remained on improving the overall emulation of machines. This paradigm eventually changed starting February 24th 2016 with v0.171 and the integration of *MEWUI*, a *MAME* derivative that extended the official *MAME* internal interface into a full-featured UI.

MAME finally have a user interface allowing to manage nearly everything it has to offer. However, some advanced *MAME* features are still accessible through cumbersome ways with the default UI. As *MAME* remains a fully opened emulator, it can still be used in association with dedicated front-ends that can provide an alternative user experience. Negatron is one of them.
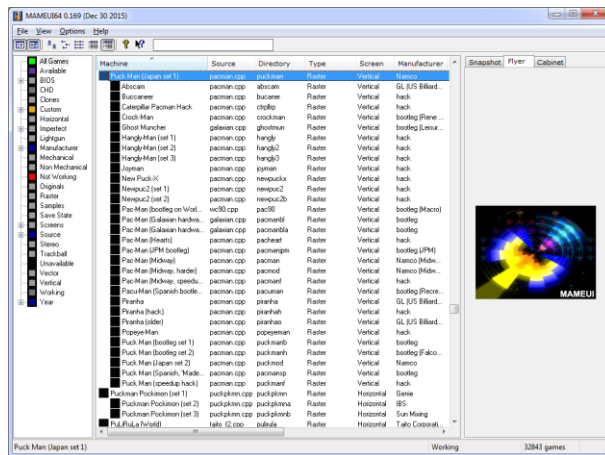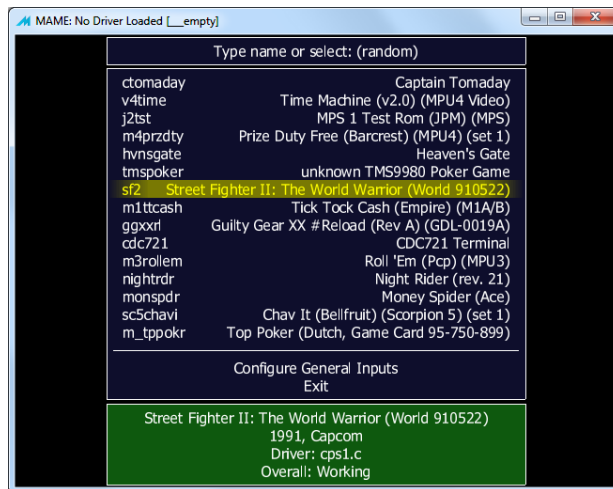
Figure 2 MAMEUI v0.169

Figure 3 MAME internal UI before 0.171

Figure 4 MAME internal UI since v0.171

About Negatron

Negatron is yet another front-end for *MAME*, the well-known multi-system emulator.

The production of *Negatron* began on July 7th, 2015, because of the inability of any existing front-ends at the time to entirely unlock all the features *MAME* has to offer, especially since it has completely merged with its sister project – *MESS* – in v0.162, which features a dynamic system of contextual configuration of the emulated machines: the **slot expansion** system.

FRONT-END CATEGORY

Front-ends can be classified into 2 broad categories:

- Desktop front-ends, geared to easily handle the huge machine database of *MAME*,
- Multimedia-styled front-ends, trying to propose a practical navigation system for computers (or TV sets) interfaced through remote controllers or arcade-styled control panels.

Negatron pertains to the first category as the huge number of emulated machines by *MAME* cannot be efficiently browsed through without a desktop-styled user interface and a keyboard-mouse set. Still, multimedia-styled front-ends are often favoured for their eye-candy and fully animated user interfaces. Nevertheless, *Negatron* doesn't entirely ignore this eye-candy aspect and compensate its less impressive interface with an intuitive and largely more ergonomic one.

Moreover, only desktop-typed applications can easily manage the concept of **slot expansion** (further explanations on the next section). Its intricate complexity when having to handle machines with a lot of parameters isn't really compatible with the seamless interacting motto sought after by multimedia-styled front-ends.

MAME MANAGEMENT SYSTEM

When surveying the available front-ends, most of them can only manage the emulated arcade machines, which obey the typical "one emulator to multiple game images" association rule. But since v0.162, *MAME* officially supports computer and console-like machines.

While arcade machines were mostly fixed packaged hardware sets, computers and consoles came in different hardware flavours and could actually be only used associated with a variety of software extensions, them being available through cassettes, cartridges, optical disks or even flash drives. To perfectly emulate all those features, *MESS* developed the concepts of software list (introduced by Wilbert Pol on May 22th, 2010, with v0.138) and slot expansion (introduced by Fabio Priuli on February 11th, 2013, with v0.148u1). Their implications can be summed up into 4 points:

1. For machines accepting cassettes/cartridges/optical discs, *MAME* adds a third indirection level to the above-mentioned association rule through **software lists**, i.e. instead of having an emulator managing a game library, *MAME* is an emulator managing a machine library, a machine being possibly bound to a software library.
2. A particular emulated machine can actually be bound to several software lists as its real counterpart could have several input **devices**, e.g. a cartridge slot and a CD-ROM drive.
3. Some machines could have optional or replaceable hardware parts, connected to the machine through specific **slots** and possibly modifying its behaviour.

4. Lastly, any changes to a machine parameter can trigger the appearance of **additional parameters**, them being new devices or new slots.

As of April 2016, only a handful of desktop-styled front-ends could handle the software lists and the slot expansion system, but none could totally support the above mentioned 4 points:

- Software lists were supported by *MEWUI*[1], *MESSUI*, *Emu Loader* and *QMC2*,
- Devices were supported by *MESSUI* and *QMC2*,
- Slots were only supported by *QMC2*,
- *QMC2* could partially manage the dynamic appearance of additional parameters.

So, *Negatron* was engineered to entirely cover all those points, and assist users in managing them as intuitively as possible. It certainly does not cover every functionality *MAME* offers, it simply focuses on the most useful ones.
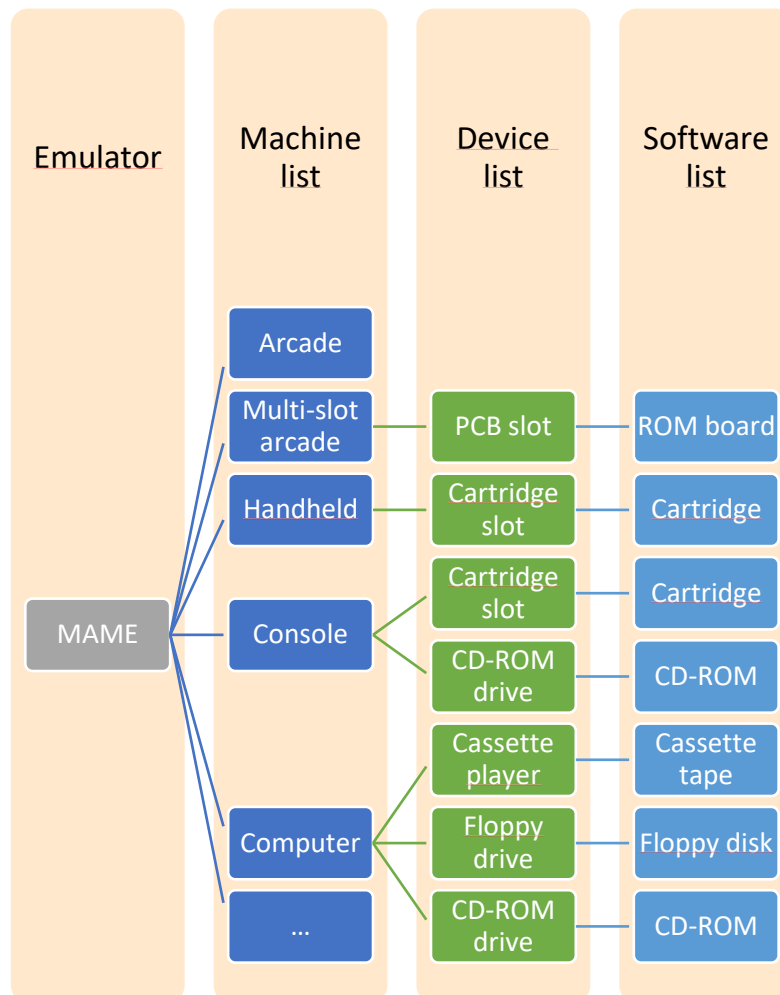

Figure 5 MAME *association rule: one emulator to several machines to multiple pieces of software*

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[1] *MEWUI* has been integrated into *MAME* since February 24th 2016 with v0.171.

VIDEO GAME PRESERVATION

Video games, also known as interactive media, are more and more recognised as a form of art worthy of physical preservation. Hence, museums are being built and opened all over the world, e.g. the _Computerspielemuseum_ at Berlin in Germany, the _Nexon Computer Museum_ on Jeju Island in South Korea, or the _Videogame History Museum_ at Frisco in the state of Texas, USA.

Some other curated initiatives work at preserving those media mainly in digital form, e.g. the _Preserving Virtual Worlds_ project led by the University of Illinois, the European _KEEP_ (Keeping Emulation Environments Portable), or the _Game Archive Project_ of the Ritsumeikan University. Nevertheless, because of the legal complications, video game preservation is still mainly going through personal projects maintained by individuals on private funds.
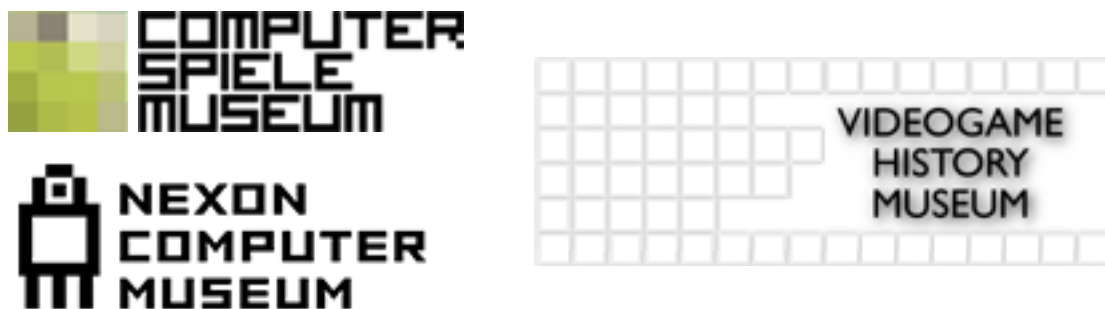

Figure 6 The logos of some museums dedicated to video games

One of those early personal projects is _MAME_, which main goal is to preserve video game history by documenting the original hardware using application code that can emulate their original behaviour as accurately as possible, i.e. the documentation is the application code itself. As hardware hardly works without software, _MAME_ also maintains a database of the accompanying software, describing how they should be in pure digital form.

Yet, video games weren't just sold as raw pieces of hardware and software, they were also sold in neat packaging along marketing campaigns. Despite the gaming industry is moving towards pure digital form, some other private projects strive to archive complete digital sets representing in-game screenshots, raw hardware, box arts, covers and manuals that went along video games sold physically. Some of those projects are called _MAME EXTRAs_, massive attempts to build complete information sets around _MAME_ that nowadays mainly draw from the resources made available by AntoPISA from _Progetto-Snaps_. Another one is _Emumovies_. Originally focused on capturing video sequences representative of the related games, it has become a paid service proposing a complete set of resources as well.


Figure 7 The logos of some projects building allaround information set about video games

Some others are more focused on a single kind of materials. For instance, the *Cover Collections* project hosted within the *GBAtemp* forums gathers a whole list of covers for a selected set of consoles. Some of its covers were drawn from the *Cover Project*, which acquires covers and inserts of jewel and keep cases. Besides, the project hosted at *NintAndBox* amazingly collects game boxes related to *Nintendo* consoles in the form of folding carton templates, i.e. as printable paperboard blanks that can be folded and sealed.

In order to ease the execution of this kind of projects around *MAME*, *Negatron* is thus also engineered as a video game information management system that can automatically organise those resources in a pre-defined way through drag and drop operations, and display them rightly associated with the related machines or pieces of software, this way helping to create a complete **information set** about video game history.

Cabinet	Control Panel	Flyer	…	Package	Media	Manual	…

Hardware	Software
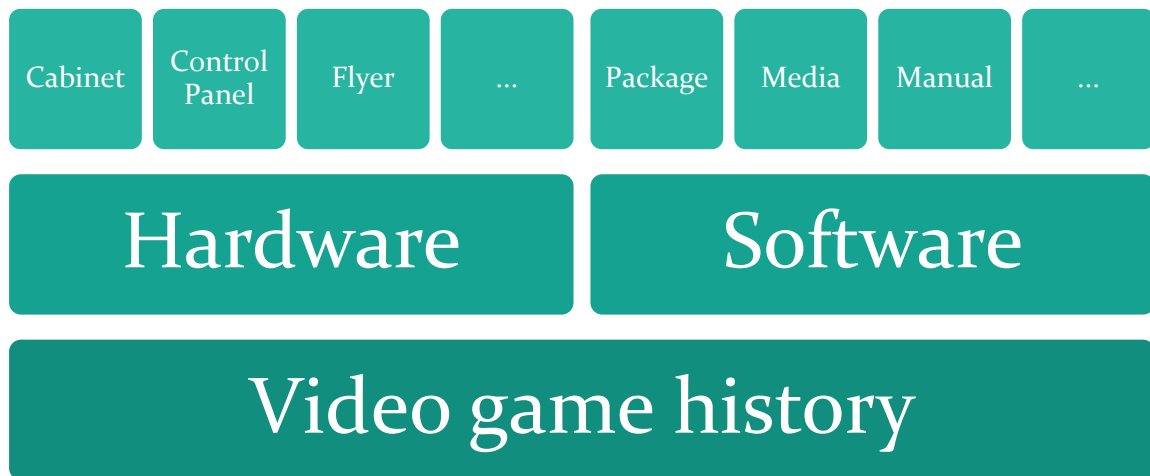
Video game history

Figure 8 Video game history, made through games and a whole wealth of rich cultural material

Emulation management

Negatron is a Java application. So as most Java applications, it can work on any desktop computers under Windows, MacOS X or Linux. Negatron hasn't been designed to run under small screen portable devices, and any attempts to do so is discouraged as it may lead to a poor user experience.

PREREQUISITES

Java

Negatron requires a Java runtime environment (JRE) to work: ensure that your computer has at least Java version 8 update 40, or newer. If you have any doubt, you can simply download Oracle's latest Java version at http://www.java.com and install it on your computer. Advanced users can alternatively use OpenJDK with OpenJFX.

For Oracle's Java, you can find the supported system configurations at Java SE Overview > General FAQs > Java SE 8 Supported System Configurations. The below table sums up the situation.

Operating System	Platform	General Support	3D Support
Windows	Windows Vista SP2	Works out of the box	Nvidia GeForce 8 and 100 series or higher,
	Windows 7 SP1		
	Windows 8.x		AMD Radeon HD 2400 or higher,
	Windows 10		Intel GMA 4500 and GMA HD
Max OS X	Mountain Lion 10.8.3+		Works on any certified OS X systems
	Mavericks 10.9		
	Yosemite 10.10		
	El Capitan 10.11		
Linux[2]	Suse 10 SP2+	gtk2 2.18+ is required	Nvidia and AMD graphic cards with proprietary drivers[3]
	Suse 11.x – 12.x	Works out of the box	
	Red Hat 6.x – 7.x		Intel graphic cards with open source drivers
	Oracle 6.x – 7.x		
	Ubuntu 12.04 – 15.x		

Negatron doesn't support mobile devices working on Android or iOS. Indeed, as of April 2016, the official flavour of Java on Android is still based on Oracle's Java 7 and iOS doesn't officially support Java.

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[2] This table only lists the Linux platforms for which Oracle provides official supports. But Java should also work on other Linux distributions, e.g. support for Red Hat 6+ implies that Java should also work on Fedora 12+ as Red Hat is based on Fedora.
[3] 3D support for open source drivers can still be forced using -Dprism.forceGPU=true.

VLC

Negatron also optionally requires VLC media player v2.2.0+ to be installed on your computer to be able to launch video previews of the emulated games. Simply get the latest version for your specific OS at http://www.videolan.org. Be aware that, for this to work, your versions of VLC and Java must have the same bitness, be it 32-bit or 64-bit.

If you prefer to use the portable version of VLC, Negatron won't be able to find it automatically. To fix this, you can simply input the path to VLC in the global configuration pane and restart Negatron.

Mame

Negatron requires MAME v0.162 or newer, although older versions of MAME and MESS may work. You can get the latest version for your specific OS at http://www.mamedev.org.

Negatron works out of the box with the official Windows binaries, but also with the packages for Mac OS X and the various Linux distros.

Some Linux distros don't install the software lists and the tool CHDMAN along MAME but instead package them separately. Thus, for Negatron to be fully operational, just installing the main `mame` package may not be enough. On Ubuntu, `mame-data` is automatically installed along MAME but `mame-tools` is also required, on Fedora the additional `mame-data-software-lists` package is mandatory too.

Finally, advanced users can compile their own versions of MAME directly from the source code and still use Negatron as the front-end. They simply have to make sure that produced initialisation files are called mame.ini or mess.ini.

COMMON USE CASE

Download and unpack Negatron, then launch it as followed:

- On Linux, launch Negatron.sh,
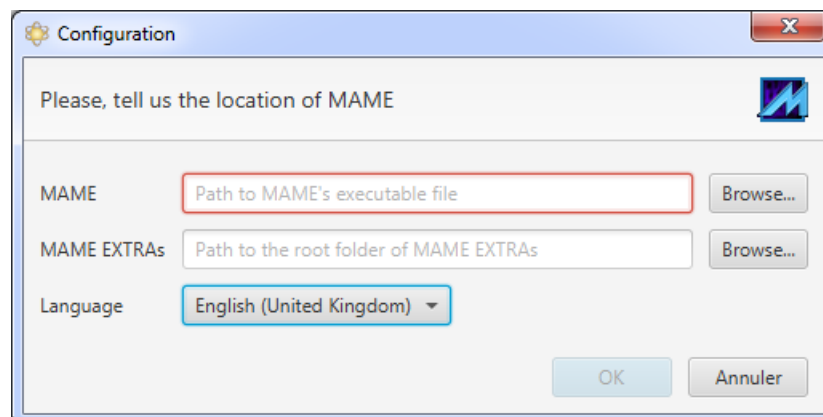- On Mac OS X, launch Negatron.command,
- On Windows, launch Negatron.exe.

Figure 9 The preliminary configuration dialog box

It will first prompt for the locations of the MAME executable and the MAME EXTRAs root folder:

- The path to MAME's executable file is mandatory,
- The path to the root folder of MAME EXTRAs is optional,
- The displayed language can be changed into another one that you may better understand.

MAME EXTRAs designs sets of folders and files that greatly enhances navigation in MAME dedicated front-ends by providing actual pictures of arcade cabinets, input devices and in-game screenshots, among other kinds of information on machines and pieces of software. Please see the *Information Management* chapter for further information.

After this preliminary prompt, Negatron will load the MAME machine database, cache it and eventually display the main navigation window.

Figure 10 The main navigation window

The main navigation window is composed of the machine list on the left and the machine information pane on the right. The machine list is organised as a tree representing the typical parent-clone hierarchy used in MAME. If MAME EXTRAs paths are properly configured and your computer does hold the related resource files, the machine information pane displays the resources associated with the selected machine in the machine list, otherwise it simply goes with information related to

Negatron by default. For further information on the information pane, please refer to the *Information Management* chapter.

On the bottom of the main navigation window lies the status bar, which contains a series of action buttons:

1. The MAME launch button launches the emulator with the currently selected machine. The same action can be done by double-clicking on a machine name in the machine list with the mouse or by typing on the Enter/Return key of the keyboard after machine selection.
2. The advanced parametrisation button opens a dialog box translating the current machine selection into a MAME native parametrised command line and allows to edit it further before launch.
3. The favourites view button allows to get access to your favourites, and possibly edit them.
4. The sound on/off button enables or disables sounds produced by Negatron.
5. The video on/off button enables or disables video previews shown in the In-Game Content tab.
6. The global configuration button opens a pane with 2 tabs:
    a. The folders tab contains most of the paths related to MAME and MAME EXTRAs.
    b. The options tab allows to modify some handy options for MAME and Negatron.
7. The about button directly shows some basic information about Negatron.
8. The cache loading animation is displayed while Negatron is checking and possibly updating its cache.

On the top of the machine list lies a series of controls focusing on machine browsing:

A. The tree view button allows to organise the content of the machine list following the default parent-clone hierarchy used in MAME.
B. The table view button allows to display its content following a flat list of machines.
C. The filter text box allows to filter out machine entries whose <u>description</u> doesn't match the content of the text box.
D. The advanced machine filter pane is available by clicking in the [+] button next to the filter text box, and presents a dozen more criteria to play with.
E. The expand all button forces the expansion of every machine node in the tree view mode.
F. The collapse all button forces the collapsing of every node in the tree view mode.
G. While the focus is on the machine list, several handy commands can be used:
    a. Quickly type the <u>name</u> of a machine on your keyboard to directly navigate towards its entry.
    b. Shift click on column headers to sort several columns simultaneously. Some dots or numbers will appear below the arrows showing the sort direction: the lower number, the higher sorting priority.
    c. The *Config* column shows which machine has specific parameters.
    d. The *Support* column specifies a subjective notation of the emulation quality level of the corresponding machine (possible indications: preliminary, imperfect, good).
    e. The *Status* column indicates whether all the required ROM images are available to MAME to run the related machine (possible indications: don't know, no, yes).
H. By clicking on the [+] button displayed on the right hand side of the machine list header, a column list appears allowing to select which columns should be hidden and shown.
I. The star button allows to insert the current machine configuration to your favourites.

So browse through the machine list, select a machine, launch it with MAME, and enjoy several decades of gaming.

MACHINES WITH SPECIFIC PARAMETERS

Some machines can take optional parameters, which can dramatically change their behaviour. Some others require specific parameters in order to launch in a working state, e.g. a console which needs a game cartridge to be put on top of it in the real world will need a ROM image of this cartridge to be passed as a parameter to MAME.
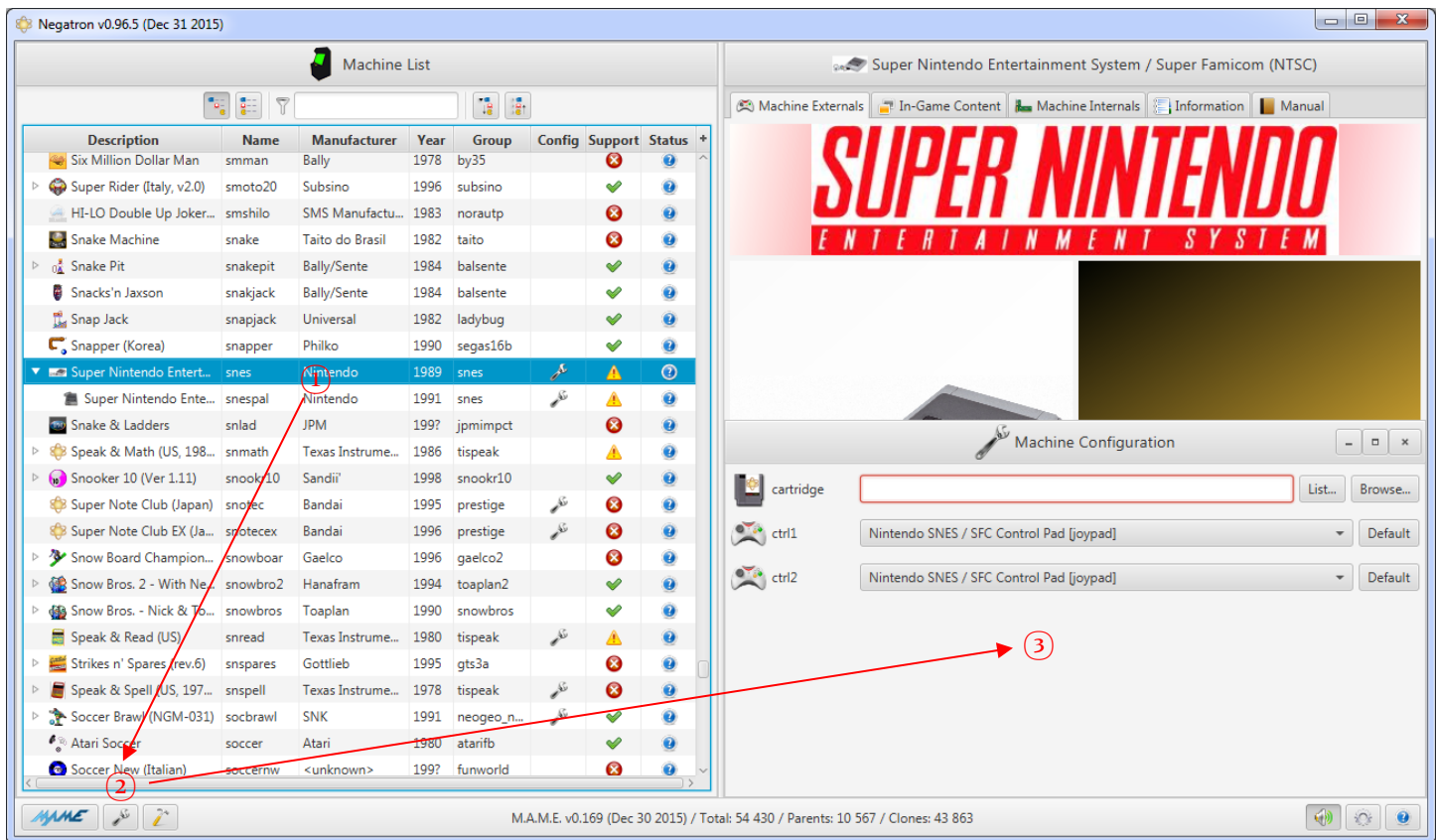

Figure 11 The procedure to get to the machine configuration pane

Through the **slot expansion** system featured in MAME, Negatron simplifies the task to know what is optional or mandatory for a particular machine by showing a pane containing all the parameters available to a machine: the machine configuration pane.

To get to the machine configuration pane, follow the below procedure:

1. Select a machine that take specific parameters, e.g. the Sega Game Gear.
2. If the selected machine does take parameters, the machine configuration button should appear between the MAME launch button and the advanced parametrisation button.
3. Click on it to open the machine configuration pane, which then covers the lower part of the machine information pane.

To get access to the machine configuration pane, you can alternatively right-click on the machine entry in the list with your mouse or type on the *Space* bar on your keyboard after machine selection.
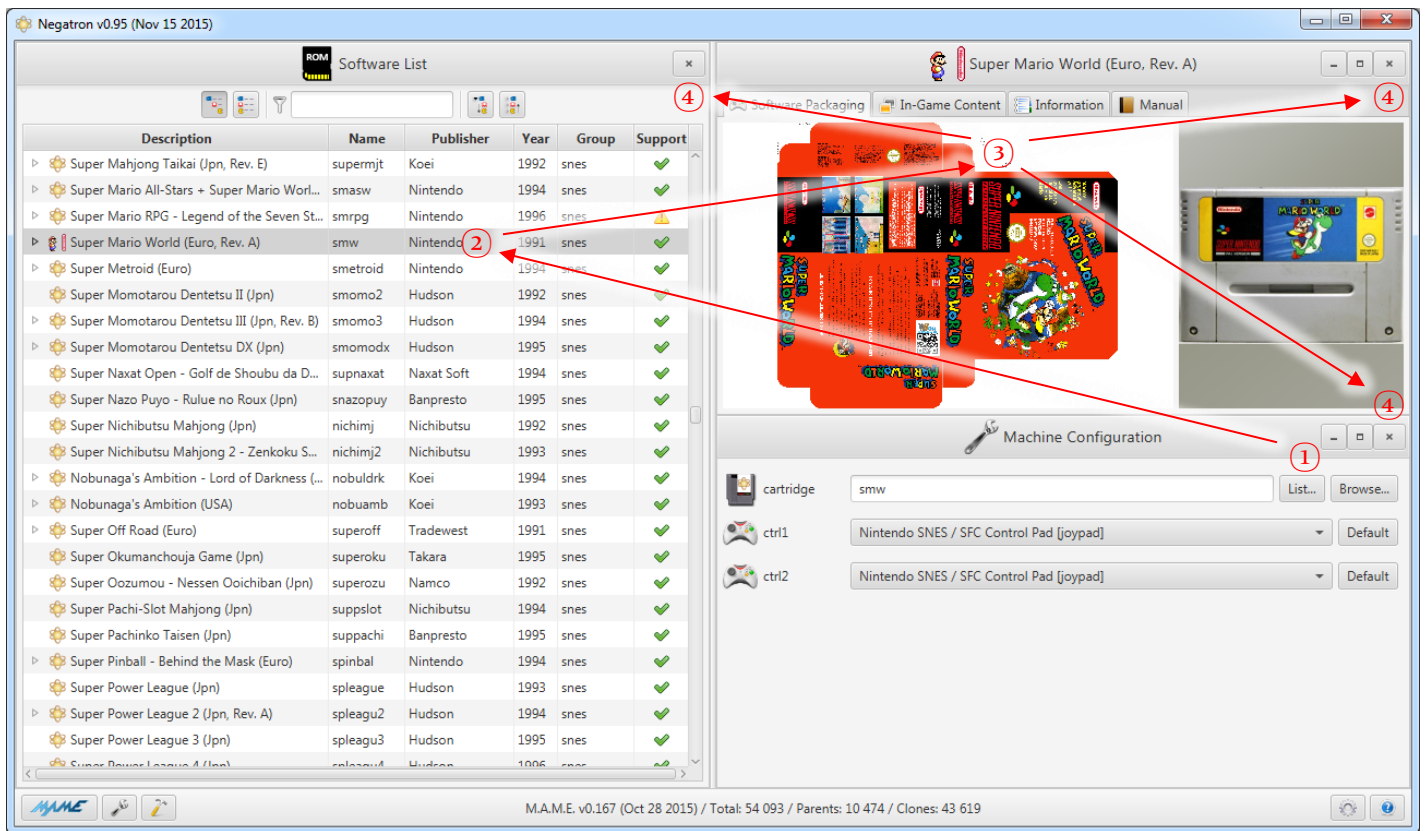

Figure 12 The software dedicated panes

Some parameters propose a selection of items to choose from, others are meant to take a file path, which is hinted at with the occurrence of a browse button, others again can additionally take an item coming from a **software list**, which is hinted at with the occurrence of a list button. In this case, additional panes dedicated to software show one by one, eventually covering all the machine dedicated panes:

1. By clicking on the list button, the software list appears by covering the machine list.
2. When selecting a software entry from the software list, the software information pane appears by covering what was still visible of the machine information pane.
3. The software information pane works the same way as the machine information pane.
4. To return to the machine dedicated panes, simply click on one of the close buttons. Alternatively, type on the *Escape* key on your keyboard for the same result.

In very complex machine configuration, some parameter editions can trigger the modification, addition or deletion of some other parameters. In the two former cases, a badge appears next to the icon of the related parameters so that you can easily spot all those changes.

In the specific case of parameters taking hard disks, a button Create appears giving access to a wizard easing the creation of read-write blank hard disk images. Those images can then be used, for instance, to install the operating system of an emulated computer.
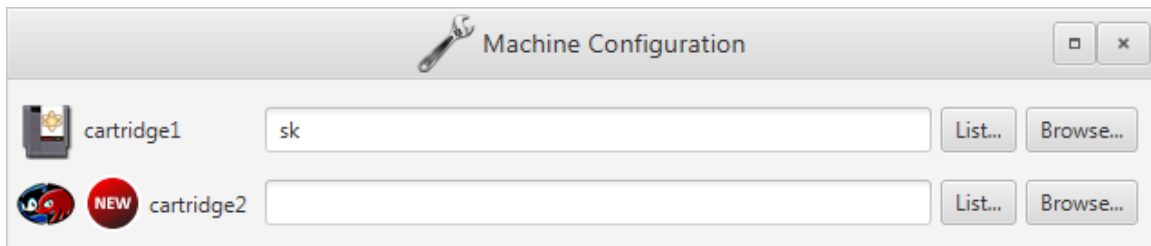
Figure 13 After selecting Sonic&Knuckles (Mega Drive) appears the corresponding lock-on cartridge slot
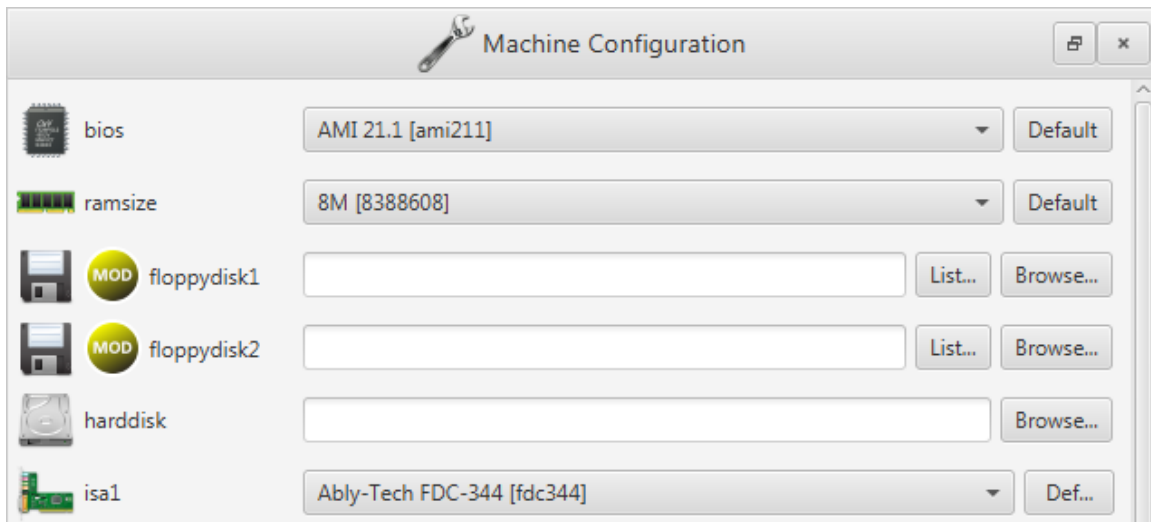

Figure 14 Editing any parameters of a PC/AT computer usually triggers a whole chain of modifications

MULTIPART SOFTWARE

Some software can be composed of several different parts, e.g. a set of 5 floppy disks, a set of 3 CD-ROMs or even a mixed set of 1 floppy disk and 1 CD-ROM. By default, MAME will select the first corresponding part of a given set. But Negatron allows to easily put several parts into specific machine devices following 2 different ways.

As for machines, the *Config* column indicates whether a software is composed of several parts or not. In the former case, the software configuration pane can be used to match the required parts to the wanted devices, or some combo boxes appear directly on the related devices in the machine configuration pane to perform the same action from the machine point of view.

To get access to the software configuration machine or activate those device combo boxes, follow the below procedure:

1. Select a software that is composed of several parts, e.g. Microsoft Windows 2.1 for PC.
2. If the selected software is indeed composed of several parts, the software configuration button should appear between the machine configuration button and the advanced parametrisation button.

3. Click on it to open the software configuration pane, which then covers the lower part of the software list.
4. Select matching devices for software parts from the *Assignment* column.
5. Alternatively, select matching software parts for devices from the device combo boxes.

To get access to the software configuration pane, you can alternatively right-click on the software entry in the list with your mouse or type on the *Space* bar on your keyboard after software selection.
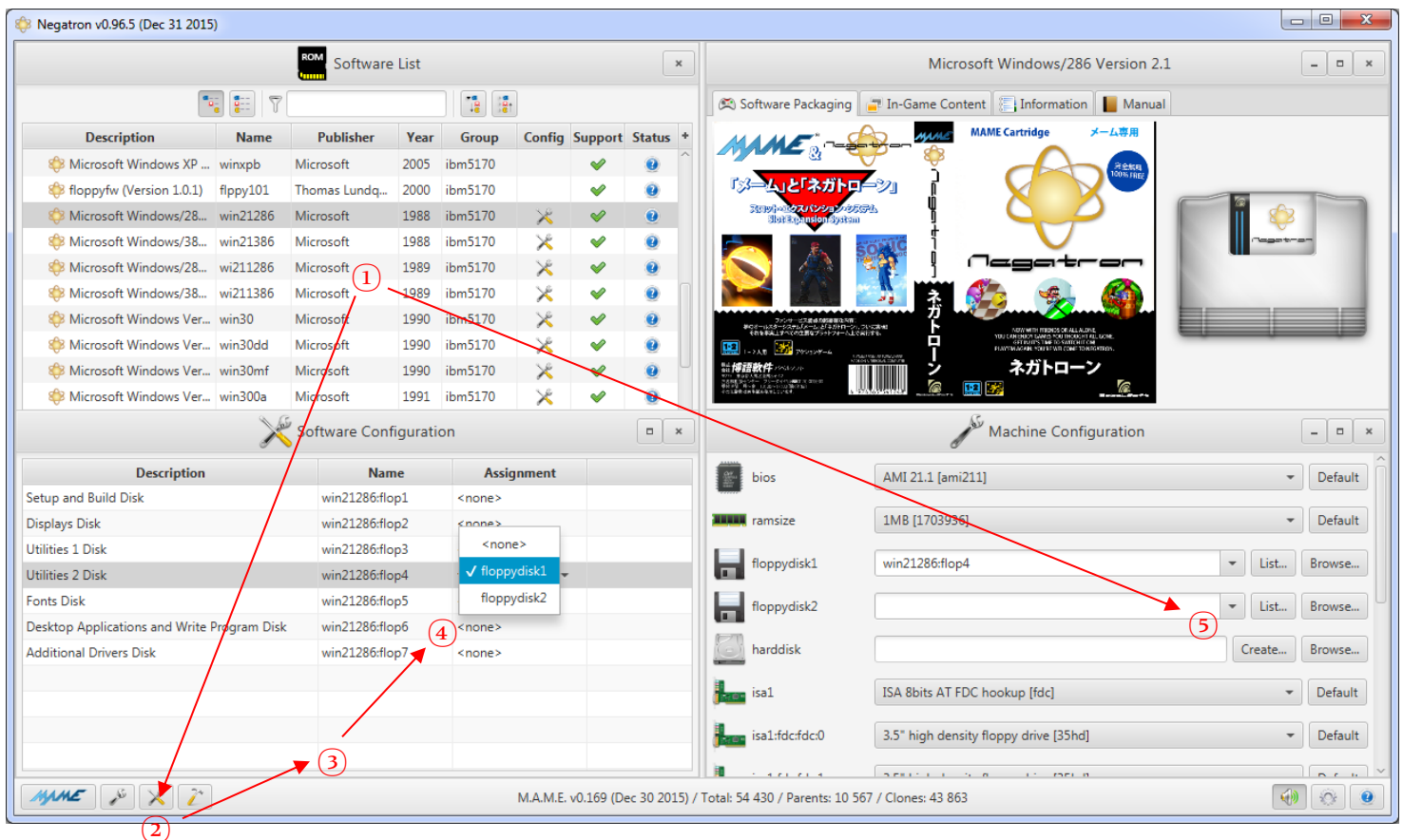

Figure 15 The procedure to get to the software configuration pane and to the device combo boxes

FAVOURITES

If you often come back to the same games, you can easily gather them all together within your favourites and this way get instant access to those particular games.

You can build your favourite collection using 2 different ways:

- Browsing the machine list as usual and then insert the machine configuration by clicking on the star button next to the machine/software title on the top right of Negatron window.
- Directly open the favourite pane and build your collection from there by adding blank rows and then editing them one by one.
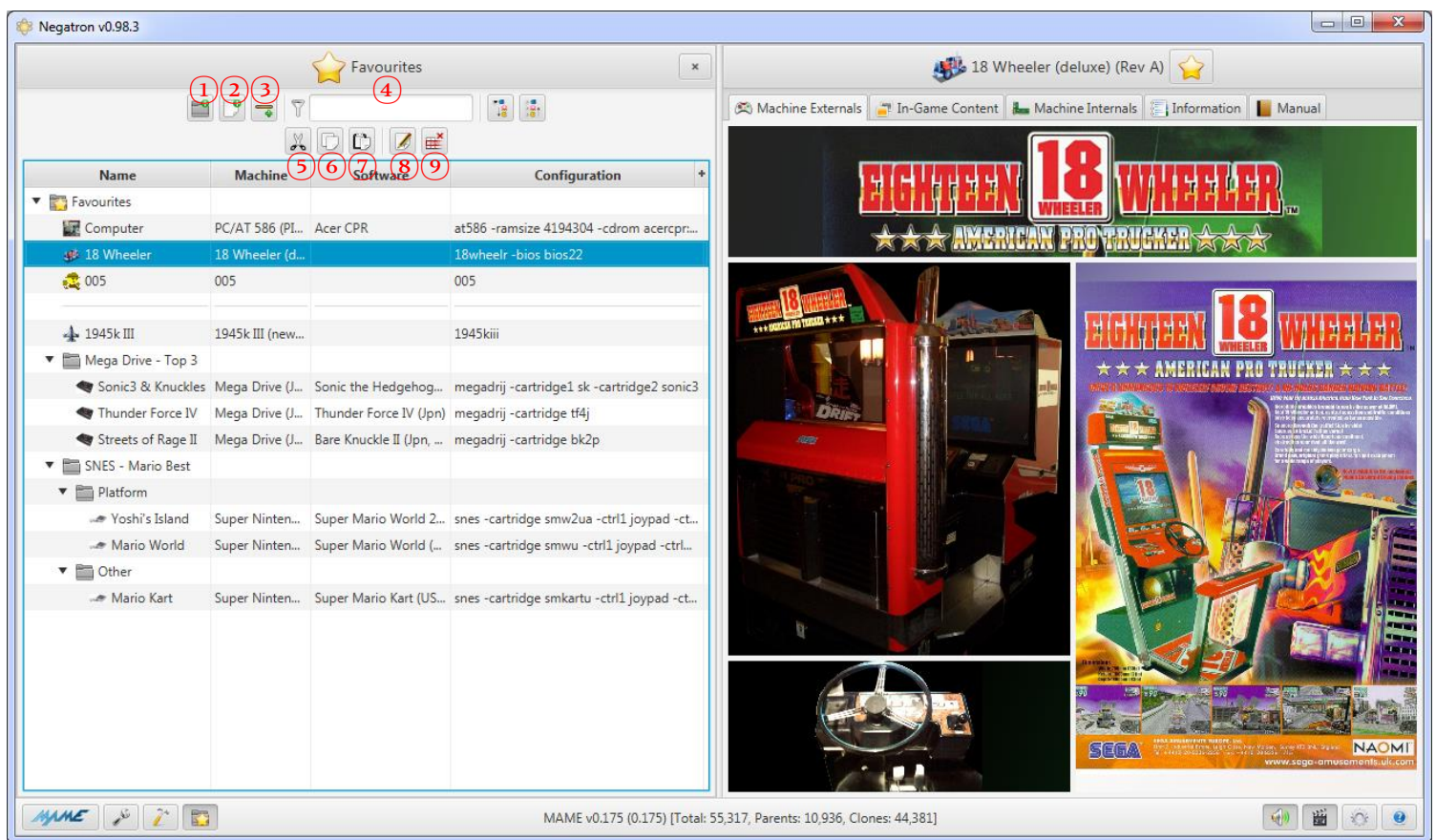
Figure 16 The favourite pane

The favourite pane houses at its top a selection of buttons, which should help you into editing your personal favourite tree:

1. The new folder button can insert a folder or subfolder anywhere in the favourite tree.
2. The new favourite button creates a new blank favourite row, which can then be edited.
3. The new separator button inserts a horizontal line behaving as a visual separator.
4. The search text field allows user to quickly search for a particular favourite item based on its name.
5. The cut button lets users perform the first step of a cut'n paste operation in order to move some rows around.
6. The copy button lets users perform the first step of a copy-pasting operation in order to duplicate some rows at another location.
7. The paste button lets users perform the second and last step of cut or copy-pasting operation.
8. The edit button allows to edit the first cell of the currently selected favourite row. You can jump from a cell to the next by clicking this button several times.
9. The delete button simply deletes any selected rows from the tree.

You can also perform copy-pasting operations with the standard Ctrl+X, C or V keyboard shortcuts. Cut'n paste operations can also be done using the mouse with drag'n drop operations.

GLOBAL CONFIGURATION – OPTIONS

Some handy options can be modified from the global configuration pane. Those options are split into 2 columns, following if they pertain to MAME or to Negatron:

- MAME options
  1. The Cheat Menu can be enabled or disabled for every game in MAME. If enabled, after launching MAME, type on the Tab key of your keyboard to see MAME's internal UI with a new Cheat entry. Be careful that invalid cheat files make MAME directly crash.
  2. VSync or vertical synchronisation can be enabled and associated with a particular algorithm, which is then applied to every game in MAME:
     - None for no synchronisation,
     - Double Buffering, which avoids screen tearing but at the cost of a dropped perceived framerate if your graphic card cannot keep up with your monitor's refresh rate,
     - Triple Buffering, which avoids screen tearing but at the cost of a small input lag.
- Negatron options
  1. Skin is a feature that allows to change Negatron's appearance. Currently, 2 skins are available – a light and dark ones –, which you may choose to better suit your tastes. You may even create new skins, provided that you have a good knowledge of the JavaFX version of CSS and of the internal layout structure of Negatron. All skins are located in the subfolder Negatron/theme/skin.
  2. The displayed language can be modified to another language that you may better understand. You may even localise Negatron to your own native language if it's not already available. All language strings are located in the subfolder Negatron/theme/language.
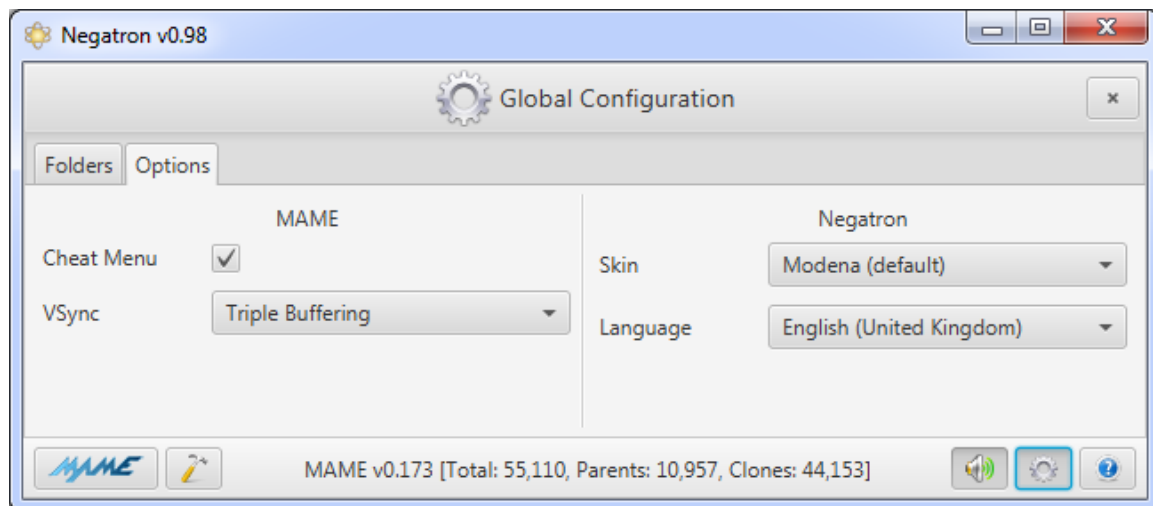

Figure 17 The global configuration pane, with a few handy options

Information management

As explained in the *Emulation Management* chapter, the preliminary configuration dialog box allows to quickly configure Negatron with the strict minimum to use it out of the box. If you fill in the optional root folder field of MAME EXTRAs, Negatron will automatically determine a default configuration suitable for a typical **information set** following the MAME EXTRAs guidelines as defined at the [Pleasuredome](#) (a website about retrogaming resources), extended with additional entries to more properly take into account the information subset pertaining to software.

GLOBAL CONFIGURATION - FOLDERS

The complete information set is structured as shown in the below figure, with some entries specific to the machine subset, others to the software subset, others again common to both subsets (entries marked with an asterisk * are not part of MAME EXTRAs as of April 2016):
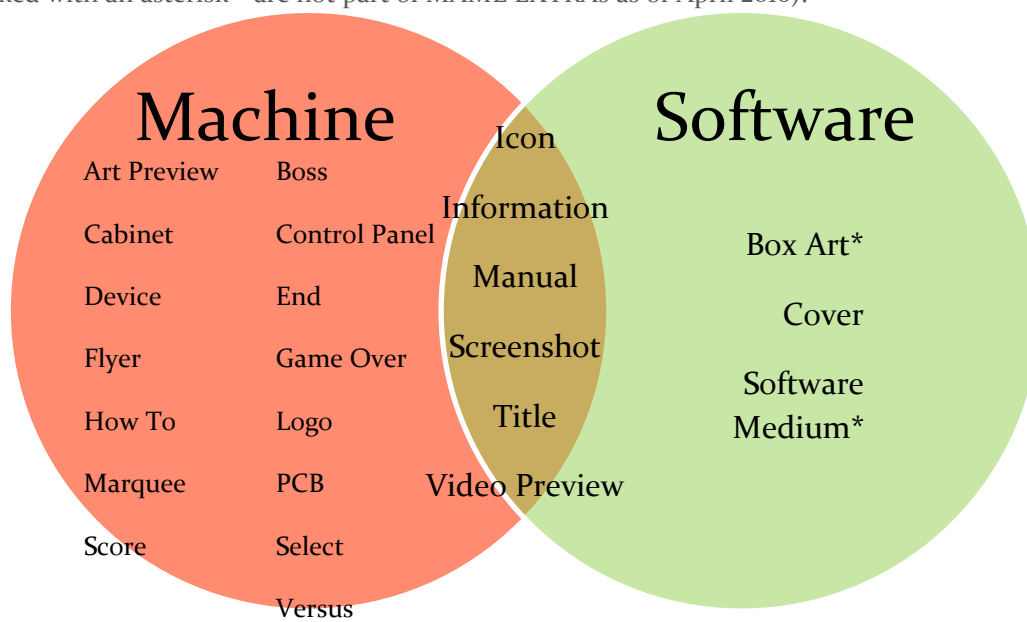

Figure 18 The structure of an information set following the MAME EXTRAs guidelines

If the default configuration doesn't suit your own information set, every entry path can be changed through the global configuration pane:

1. Icon holds the icon resources representing each item (machine or software) as a 32x32 ICO file. It does not represent actual objects linked to an item but it is simply used as a quick visual cue within Negatron's interface.
2. Information takes the paths to DAT files giving a descriptive encyclopaedic view on all machines and software.
3. Manual represents the actual manuals or notice booklets that were provided within a packaging. They should be formatted as PDF files.
4. Screenshot caters for raster graphics formatted as JPG or PNG files representative of the gameplay of an item (machine or software). They may also be designed by the more generic term snapshot.

5. Title pertains to raster graphics representative of the title sequence of an item (machine or software).
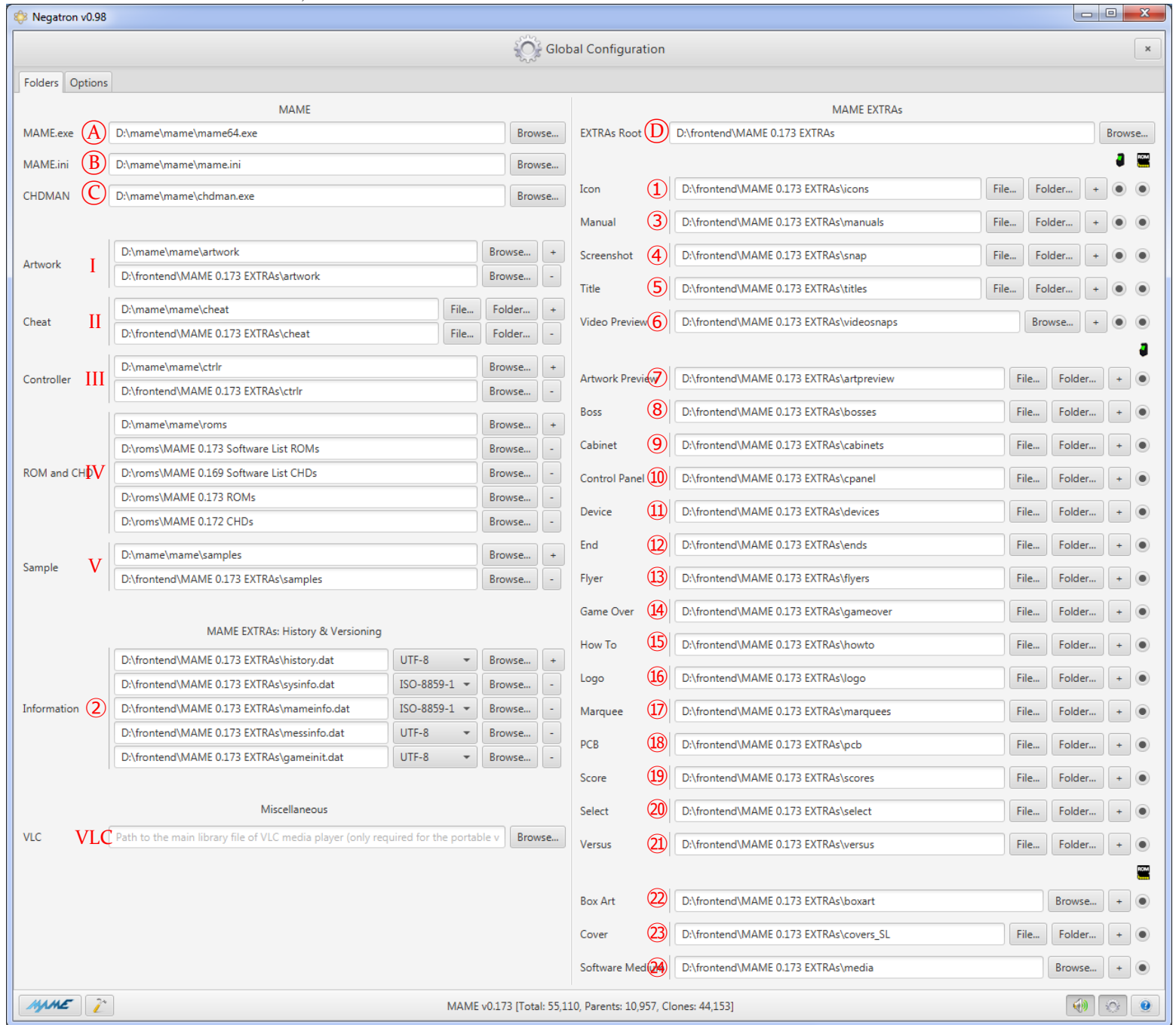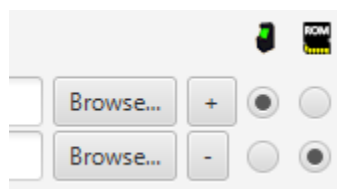

Figure 19 The global configuration pane, an example of a typical configuration

6. Video Preview stores video sequences formatted as MP4 or FLV files representative of an item (machine or software). They may also be called videosnaps or videocaps, short names for video snapshots or captures.

7. Artwork Preview demonstrates how games should be displayed when their accompanied artwork layouts are activated in MAME.

8. Boss samples what kind of enemy characters can be met at the end of game levels.
9. Cabinet refers to raster graphics representing the outside shell of a machine in its entirety.
10. Control Panel relates to raster graphics focusing on the input devices coming along a machine, them being joypads, joysticks or arcade control panels.
11. Device supplies raster graphics for every component embedded within the emulated machines. They can illustrate their CPUs, memory chips, connectors, etc.
12. End unveils how games' final ending sequences look like.
13. Flyer deals with raster graphics representing typical advertisement pamphlets associated with a machine.
14. Game Over reveals how games end when players lost all the allowed opportunities to keep on playing.
15. How To gives excerpts of the game operation explanatory sequences as shown in-game, also known as "how to play" sequences.
16. Logo displays the logos of the companies that participated in the conception of the games as they appear in-game.
17. Marquee is about raster graphics representing the typical signs placed at the top of arcade cabinets. For non-arcade machines, it usually represents their brands as logos.
18. PCB stands for printed circuit boards and holds the raster graphics representative of the main electronic board of a machine.
19. Score shows the in-game scoreboards.
20. Select exhibits the in-game character selection screens.
21. Versus exemplifies versus character splashes as they would typically appear in-game, particularly in fighting games.
22. Box Art* provides raster graphics corresponding to the artworks found on the external packages holding software media, manuals and other informative leaflets together, e.g. covers for keep cases or folding carton templates for cardboard boxes. Those graphics can then be used as textures for packages modelled in 3D.
23. Cover, similarly to Box Art, also provides samples of the game packages' artworks, but here limited to the front covers.
24. Software Medium* illustrates pieces of software in their original physical forms as raster graphics, them being floppy disks, cartridges, optical discs, etc.

Some entries can take several paths. This is indicated with the occurrence of a "+" button on the first field associated with the entry. Some others are also associated with radio boxes placed on the rightmost side of the fields. This is to indicate what paths should be the preferred folders to contain new resources through drag and drop operations. If an entry makes sense for both subsets, related fields will occur with two radio boxes, one for the machine subset and another for the software subset, otherwise it will occur with a single radio box.

Figure 20 Specific user interface controls for specific configuration settings

On the global configuration pane, the three first entries give the paths of the three items without which Negatron cannot work:

A. MAME.exe indicates the path to MAME's main executable. Upon modification, Negatron should be restarted to properly update both machine and software lists.
B. MAME.ini points to the initialisation file that Negatron updates when entries I to V are modified.
C. Chdman specifies the path to the tool CHDMAN, used to create blank HDDs through a wizard effectively shown for hard disk entries in the machine parameter pane.
D. If you edit the EXTRAs Root field, all the MAME EXTRAs related fields will be synchronised accordingly on the fly, saving you from the hassle to update every single fields manually.

The other entries directly apply to MAME:

I. Artwork contains sets of artwork files that are applied following defined layouts around the main game screen while in-game.
II. Cheat emulates a cheating device equivalent to the infamous Game Genie by providing cheat codes through XML files that can modify game behaviour. Those cheat codes can then be selected through the internal user interface of MAME while in-game.
III. Controller gives the button mapping between your own input device and the emulated ones.
IV. ROM and CHD includes every software images needed by machines emulated in MAME, ROMs being images of mask ROM chips' content and CHDs being images of hard disks or optical disks' content.
V. Sample covers the placeholders of sound effects that can't be easily emulated as being originally emitted by discrete circuitries.

Please refer to the MAME documentation for further information.

A last path entry for VLC can be used to let Negatron know where to find VLC if you use the portable version. Indeed, normally Negatron should be able to automatically detect an installed version of VLC. For all other cases or if any problems arise, filling this path in should fix everything.

INFORMATION PANES

If Negatron is rightly configured, the complete **information set** available on your computer can be displayed by both the machine and software information panes. But instead of bringing in an already built information set, you can on the contrary build a new one through drag and drop operations on both information panes, or even complete an already existing one in the same way.

While dragging a resource on a pane, Negatron will give you visual clues indicating whether the resource file is in an acceptable format and can be dropped. Negatron checks for resource compatibility only based on the file extension, and doesn't check for malformed files or files with wrong extensions (indeed, JPG files are often renamed as PNG files). After dropped, the resource is <u>copied</u> into the configured preferred default folder of the corresponding entry.

The figures of the two next subsections indicates which user interface control is related to which information set entry.
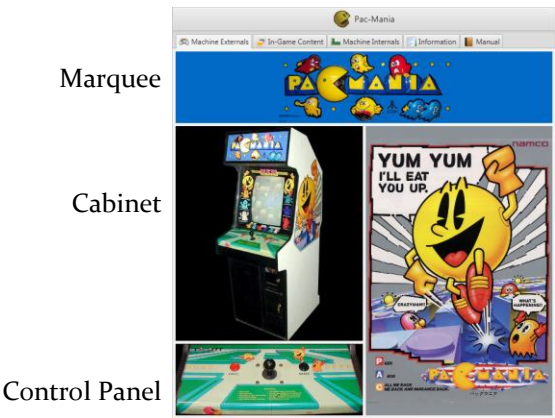
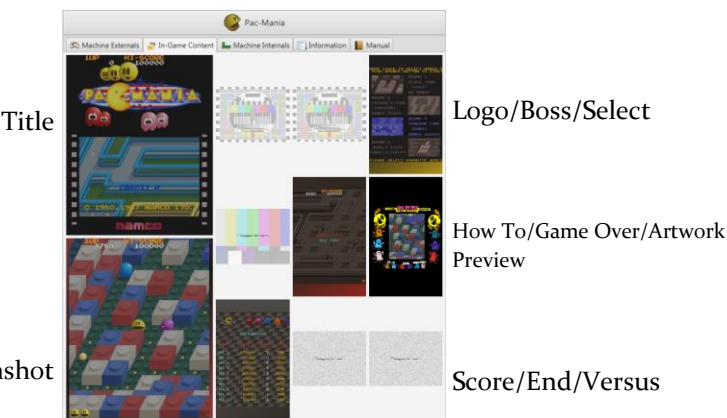## Machine information pane

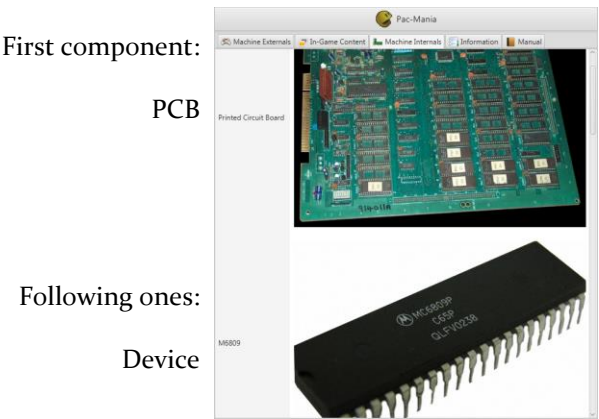*Figure 24 Machine externals tab*

Figure 23 In-game content tab

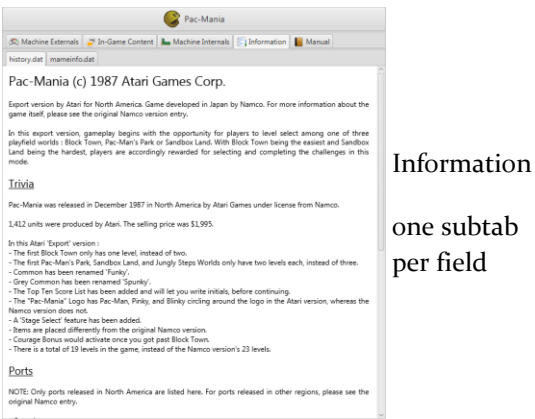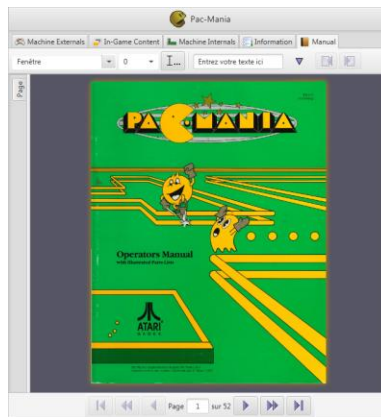*Figure 22 Machine internals tab*

Figure 21 Information tab

Figure 25 Manual tab

Manual

Software information pane

Box Art   Cover   Media

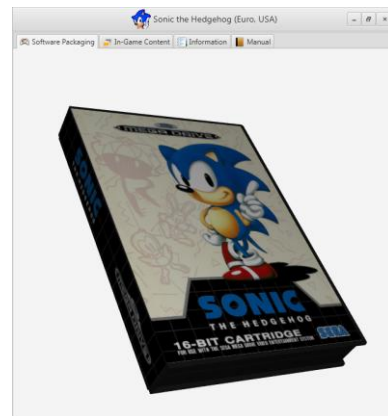*Figure 26 Software packaging tab, 2D view*

Figure 27 Software packaging tab, 3D view

Title

Screenshot

Video Preview

Figure 28 In-game content tab

Information

one subtab
per field

Figure 29 Information tab

Manual

Figure 30 Manual tab

ARTWORK FORMATS FOR THE 3D MODELS OF SOFTWARE PACKAGE

As already mentioned, the box art entry of the global configuration corresponds to the folder that holds the artworks of the original software packages, e.g. covers for keep cases or folding carton templates for cardboard boxes.

Those artworks are displayed in two different ways in Negatron:

- Shown as regular images,
- Used as textures for packages modelled in 3D.

Because of the second view mode, box arts should follow a specific format in order to have the 3D models rendered correctly. This format depends on the type of the original packaging but some principles remain true whatever the type:

- Box arts must be proportional in size to their real counterparts. Indeed, some online sources transform the original scans to adapt them to the size requirements of a particular application. Those would render incorrectly in Negatron.
- They must also respect the form of their real counterparts. For instance, the wraparound cover of a DVD keep case should be scanned as a single image, not as three separate files (one per face: front, back and spine).

The following subsections specify the different formats required for each category of packaging.

Keep case

This category of packaging is usually made of sturdy plastic and withstands the passage of time quite well. It relates to every video home formats:

- VHS, which came into two kinds of keep cases, the standard injection moulded case and the thermoformed case first employed by Disney,
- DVD, which specific keep case is also known as the Amaray case, after the company that designed it,
- Blu-ray, which uses a direct derivative of the Amaray case.

While most consoles and PC alike have adopted the keep case formats used by the video home market post-2000, only Sega and SNK used keep cases during the 1990s.

For keep cases, artworks only consist of the wraparound cover as pictured in the below figure.
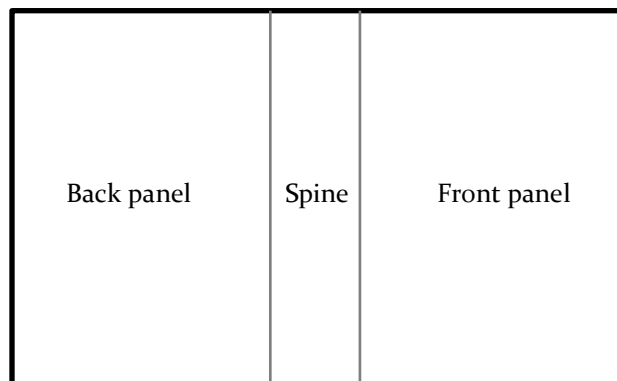
*Figure 31 Artwork format for keep cases*

Pressboard box

Also known as cardboard box, this category of packaging is made of thick paper-based material, which can quickly deteriorate if it isn't handled carefully. Largely employed in a lot of domains since the 19th century, particularly the pharmaceutical domain, it has been the solution of choice for Nintendo needs throughout the 1980s and the 1990s.

For pressboard boxes, artworks must reproduce the folding carton templates that made up the original boxes. The below figures illustrate the different styles of folding cartons.
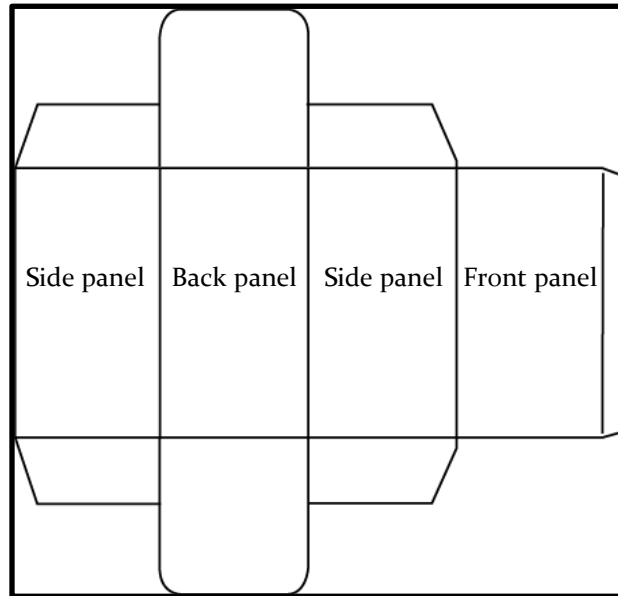
Figure 32 Artwork format for straight tuck end boxes
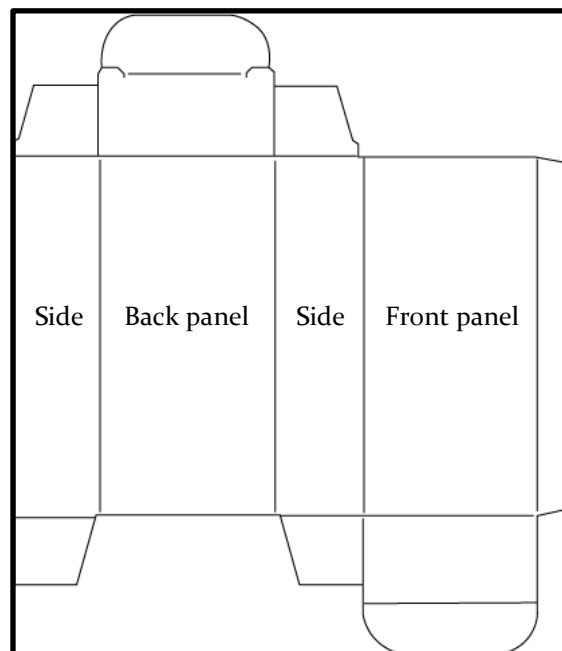
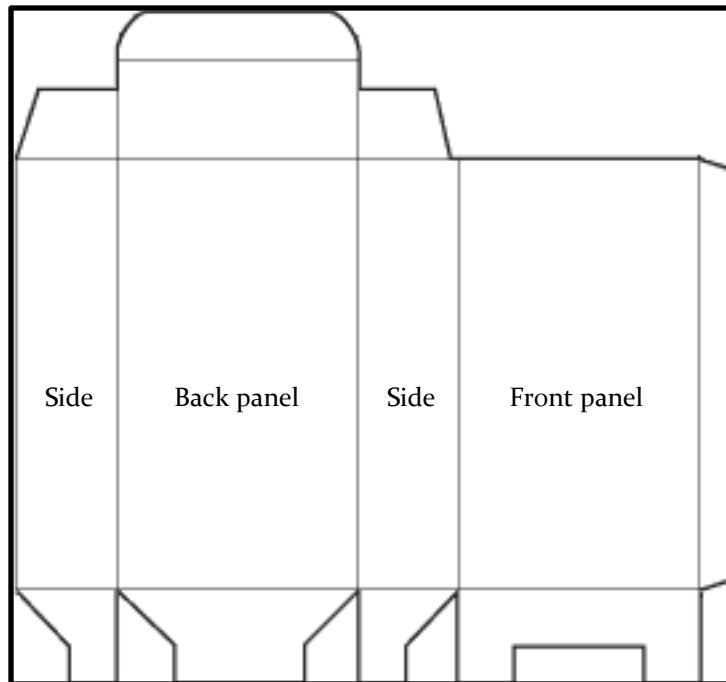*Figure 33 Artwork format for reverse tuck end boxes*

Figure 34 Artwork format for tuck top snap lock bottom boxes

Negatron can handles every variant of the snap lock bottom form factor, i.e. the forms of the flaps and panels of the box bottom side don't have to exactly follow what is shown in figure 29. Negatron should still handle them and display them correctly in 3D.

Jewel case

This three-piece plastic case has been introduced with the very first sold audio CDs in 1982 and have been since remained associated with this futuristic engineering accomplishment, so much that Hudson Soft and NEC also released their software memory cards, called HuCard, packaged in jewel cases for their PC Engine, trying to benefit from the good image CDs had at the time.

Jewel cases come mainly in standard single or double CD cases. During the mid-1990s, Sega and Sony also released the CD-ROMs for their respective consoles packaged in jewel cases about twice taller in the USA.

TODO: model for pressboard sleeve with inner tray (e.g. MD Sonic & Knuckles), model for jewel case (CD based consoles and PC Engine)

TODO: define artwork format for jewel cases, taking into account front covers as leaflets and booklets

TODO: adapt the pressboard box model to Famicom, Super Famicom and other Nintendo consoles

3D model WIP: current state

- SMS (US & EUR) and MD (All regions) keep cases done

- NES (US & EUR) and SNES (US & EUR) pressboard boxes done

- for every other machines, use the SMS/MD keep case model by default

Acknowledgements

The term *negatron* has been first proposed by Carl D. Anderson to design regular electrons after discovering the positron in 1932, following the predictions of Paul Dirac.

The logo of Negatron is based on the old planetary model of atoms as introduced by Ernest Rutherford in 1911 and Niels Bohr in 1913. It has been since superseded by the electron cloud model as first devised by Werner Heisenberg and Erwin Schrödinger in 1925.

MAME is a registered trademark of Nicola Salmoria. MAME logo and name are used with the kind permission of the MAME team.

Most icons used in Negatron are part of the Oxygen icon library, a LGPL project developed by KDE. The exceptions are:

- MAME logo, designed by chemical and cleaned up by Exodus3D,
- The arcade machine icon, by Bruce The Deus at the Italian Wikipedia,
- The default cartridge icon is based on the NES cartridge template by VoidSentinel,
- The default media picture is based on the Neo Geo cartridge template by blinkybill,
- JavaFX and NetBeans are trademarks or copyrighted properties of Oracle America, Inc.,
- IDR Solutions Ltd is a UK company specialised in Java, PDF and HTML5 solutions,
- The remaining icons not part of *Oxygen* have been designed by BabelSoft.

Most of Negatron code base has been developed by BabelSoft. The exceptions are:

- OpenViewerFX, the integrated LGPL PDF viewer by IDR Solutions,
- The HiddenSidesPane component of ControlsFX, under the BSD 3-Clause license, which has been heavily modified to suit Negatron's need,
- The JavaFX TreeView filtering algorithm by Christoph Keimel, now part of the e(fx)clipse open source framework, under the Eclipse Public License 1.0,
- Part of DirectoryWatchService by Hindol Adhya, under the MIT license,
- Vlcj, a Java wrapper for VLC developed by Caprica Software under the GPLv3 license.

Negatron uses a graphical design theming around the following video game characters:

- Sonic the Hedgehog, a trademark of Sega Games Co., Ltd.,
- Mario and Super Mario Bros., trademarks of Nintendo Co., Ltd.,
- Pac-Man, a registered trademark of Bandai Namco Entertainment Inc..

The use of some graphical elements directly referring those characters have not been endorsed by any of the trademark holders. This has not been done in pursuit of Negatron's advertisement or commercial benefice, but any claims can be emailed to BabelSoft at cyrilapan@babelsoft.net and will be promptly complied with. Those elements are:

- Nendoroid Sonic the Hedgehog, produced by Good Smile Company,

- Nendoroid Mario, produced by Good Smile Company,
- Pac-Man Monster Truck, a custom product by KodykoalaToys,
- Sonic the Hedgehog BADASS, a fan-art by Sylvain Sarrailh, used with his kind permission,
- Super Smash Bros: Remixed – Mario, a digital art by Andrew Domachowski,
- Pac-Man Movie, a short movie produced by Steelehouse Productions,
- Sonic CD, a Mega CD game developed by Sega,
- Super Mario World, a Super NES game developed by Nintendo,
- Pac-Mania, an arcade game developed by Namco.

Appendix 1

Here is reproduced the forum post explaining how the Pleasuredome variant of the MAME 0.168 EXTRAs has been built. It has been posted by newuzer at the Pleasuredome on January 1ˢᵗ 2016.

This torrent contains the basic MAME 0.168 EXTRAs.

Many thanks to all the authors of the sources, who put in their time and effort to make it possible to freely create this collection.
Thanks for making MAME to what it is today.

*** Due to the massive amount (>137.000) of small files in this torrent, it's recommended to use a proper torrent client, like <u>uTorrent</u> ***
*** It can take a few minutes for the torrent to load into your client and your client may not respond a few times in that period, so be patient. ***
*** If you use an older version of uTorrent (not recommended!), don't forget to <u>check the cache settings</u> ***

We have chosen to keep the files unzipped (as we did in the past) so they can be used directly in MAME.
If you already have files (from previous releases), this torrent can partially be reproduced by using crlmamepro and the datfiles attached to this post.

Directory/File structure:

```
MAME 0.168 EXTRAs
├─────artwork*
├─────bkground
├─────cabdevs
├─────cpanel
├─────ctrlr
├─────flyers
├─────icons
├─────manuals
├─────marquees
├─────pcb
├─────samples*
├─────snap
├─────snaps
├─────titles
├─cheat.7z**
├─command.dat
├─hiscore.dat
├─history.dat
├─mameinfo.dat
├─messinfo.dat
└─sysinfo.dat
```

* all zipfiles in this folder are Torrentzipped
** the 7zipfile is untouched, so not Torrent7zipped

Scanning/Fixing/Rebuilding of non-zipped content with Clrmamepro:

Create a temporary folder called "_scan" in the tree where all the other folders (like artwork, snaps, etc.) are located.
Move the folder with the non-zipped content that you want to Scan/Fix/Rebuild into the "_scan" folder.
Load the representative datfile into CMP and in the Settings, point at the temporary "_scan" folder.
Scan/Fix*/Rebuild and when finished, move the folder back from the temporary "_scan" folder.
Repeat this process for all the folders with non-zipped content.
When all is finished, delete the temporary "_scan" folder.

* In case of Datfile Problem messages -> Yes To All

Applications used:
clrmamepro
torrentzip
uTorrent v3.4.2 (build 34672)

Links to the authors of the sources used:

Where possible, AntoPISA's Full Resources (MAME+MESS) DATs are used.

artwork (MAME): AntoPISA's MAME & MESS Artworks
bkground (MAMEarcade): MameUI and special thanks to Huggybaby and Sarlix for their additions
ctrlr (MAMEarcade): Pierre Kutec's
cabdevs (MAME): AntoPISA's progetto-SNAPS Devices + Cabinets & Devices + Cabinets
cpanel (MAME): AntoPISA's progetto-SNAPS Control Panels
flyers (MAME): AntoPISA's progetto-SNAPS Hi-Res FLYERs

icons (MAME): AntoPISA's progetto-SNAPS Icons (Extended Version)
manuals (MAME): AntoPISA's progetto-SNAPS Manuals
marquees (MAME): AntoPISA's progetto-SNAPS Marquees
pcb (MAME): AntoPISA's progetto-SNAPS PCB
samples (MAMEarcade): AntoPISA's progetto-SNAPS Samples
snap (MAME): AntoPISA's progetto-SNAPS Snap (In Game) + Snap (Home Boot Screen)
snaps (MESS): AntoPISA's progetto-SNAPS Software List Snapshots
titles (MAMEarcade): AntoPISA's progetto-SNAPS Titles

cheat.7z (MAME): Pugsy's Cheats
command.dat (MAMEarcade): Procyon command.dat Short-hand (rearranged version by cnterr)
hiscore.dat (MAME): Unofficial Hiscore.dat
history.dat (MAME): Arcade History

mameinfo.dat (MAMEarcade): MASH's MAMEINFO
messinfo.dat (MESS): AntoPISA's progetto-SNAPS MESS INFO.DAT (UTF8)
sysinfo.dat (MAME): Progetto EMMA

Note: MAME is MAMEarcade and MESS combined.

For this set, things have merged a bit more, as also announced by AntoPISA here.

Where possible, AntoPISA's "Full Resources (MAME+MESS) DATs" are used.

Compared to the previous 0.167 EXTRAs set, this set has the following changes:
The folders "cabdevs" (MESS), "devices" (MESS) and "cabinets" (MAMEarcade) are now merged into: "cabdevs" (MAME).
If you already own a previous EXTRAs set, make sure you've merge these 3 folders before joining this torrent.
The full resources "CabDevs 0.168" datfile represents the merged "cabdevs" content.
It saves 3691 duplicate files.

Merging these folders may have impact on certain front-ends.
It's possible that the folder location for "cabinets" needs to be changed to "cabdevs" in the mame.ini.

NU.

Appendix 2

Here is reproduced the forum post explaining how the Pleasuredome variant of the MAME 0.175 EXTRAs has been built. It has been posted by newuzer at the Pleasuredome on June 30th 2016.

This torrent contains the basic MAME EXTRAs that can be used in MAME GUIs.

Thanks goes to AntoPISA, GordonJ, B2K24, Obiwantje and oddi for their unmissable knowledge in helping to create this torrent.

Many thanks to all the authors of the sources, who put in their time and effort to make it possible to freely create this collection.
Thanks for making MAME to what it is today.

The latest available content is used at creation time.
The png content is zipped and can be used directly in MAME's own MEWUI GUI.
We are aware that the choice for zipped content makes rebuilding this set hard(er) and joining with a previous/partial set at a low percentage inevitable.

We plan to provide an update set along with this set for those willing to rebuild their previous set.

Directory/File structure:

MAME 0.175 EXTRAs

```
├────artwork
├────ctrlr
├────dats
├────folders
├────samples
├─artpreview.zip
├─bosses.zip
├─cabinets.zip
├─cheat.7z*
├─covers_SL.zip
├─cpanel.zip
├─devices.zip
├─ends.zip
├─flyers.zip
├─gameover.zip
├─howto.zip
├─icons.zip
├─logo.zip
├─manuals.zip
├─manuals_SL.zip
```

```
├─marquees.zip
├─pcb.zip
├─scores.zip
├─select.zip
├─snap.zip
├─snap_SL.zip
├─titles.zip
├─titles_SL.zip
└─versus.zip
```

* the 7zipfile is untouched, so not Torrent7zipped.

All zipfiles are Torrentzipped.

Files with _SL in their name have MAME Software List content.

Reproducing the zipped content with Clrmamepro:

Download the update set, if available.

If you own a previous set, unzip all the existing zipfiles that contain the non-zipped content into a folder of the same name (in 7-zip -> Extract to "*\").

Create a temporary folder called "_scan" in the parent folder.
Move all the (extracted) folders with the non-zipped content into the "_scan" folder.
Load the "all_non-zipped_content.dat" into CMP and in the Settings, point at the temporary "_scan" folder.
Scan/Fix*/Rebuild the content until it's 100% complete and use the update content as rebuild source.

* In case of Datfile Problem messages -> Yes To All

Zip the internal content of all the individual folders in the temporary "_scan" folder and torrentzip (64-bit) them afterwards.

Move the zipfiles from the temporary "_scan" folder to the parent folder.
When all is finished, delete the temporary "_scan" folder.

Applications used:

clrmamepro
Torrentzip.NET
qBittorent

Links to the authors of the sources used:

AntoPISA's "All progetto-SNAPS" datfile from his MAME Resources DATs is used for this set.

Folders:

artwork: AntoPISA's MAME Artworks
ctrlr: Pierre Kutec's
samples: AntoPISA's progetto-SNAPS MAME SAMPLEs

Zipped folders:

artpreview: AntoPISA's progetto-SNAPS MAME Snapshots - Artwork Preview
bosses: AntoPISA's progetto-SNAPS MAME Snapshots - Bosses
cabinets: AntoPISA's progetto-SNAPS CABINETs
covers_SL: AntoPISA's progetto-SNAPS MAME Software List Resources
cpanel: AntoPISA's progetto-SNAPS MAME CONTROL PANELs
devices: AntoPISA's progetto-SNAPS MAME DEVICEs
ends: AntoPISA's progetto-SNAPS MAME Snapshots - Ends
flyers: AntoPISA's progetto-SNAPS MAME FLYERs
gameover: AntoPISA's progetto-SNAPS MAME Snapshots - GameOver
howto: AntoPISA's progetto-SNAPS MAME Snapshots - HowTo
icons: AntoPISA's progetto-SNAPS MAME MAMu_'s Icons + Extended Version Icons
logo: AntoPISA's progetto-SNAPS MAME Snapshots - Logo
manuals: AntoPISA's progetto-SNAPS MAME MANUALs
manuals_SL: AntoPISA's progetto-SNAPS MAME Software List Resources
marquees: AntoPISA's progetto-SNAPS MAME MARQUEEs
pcb: AntoPISA's progetto-SNAPS MAME PCBs
scores: AntoPISA's progetto-SNAPS MAME Snapshots - Scores
select: AntoPISA's progetto-SNAPS MAME Snapshots - Select
snap: AntoPISA's progetto-SNAPS MAME Snapshots - Snap
snap_SL: AntoPISA's progetto-SNAPS MAME Software List Resources
titles: AntoPISA's progetto-SNAPS MAME Snapshots - Titles
titles_SL: AntoPISA's progetto-SNAPS MAME Software List Resources
versus: AntoPISA's progetto-SNAPS MAME Snapshots - Versus

MAME support files (dats & folders):

arcade.ini: AntoPISA's progetto-SNAPS (part of version.ini)
arcade_NOBIOS.ini: AntoPISA's progetto-SNAPS (part of version.ini)
category.ini: AntoPISA's progetto-SNAPS
catlist.ini: Progetto EMMA
cheat.7z: Pugsy's Cheats
command.dat: AntoPISA's progetto-SNAPS (short-hand)
gameinit.dat: AntoPISA's progetto-SNAPS
genre.ini: AntoPISA's progetto-SNAPS
hiscore.dat: Official MAMEdev Hiscore.dat (MAME-Source\Plugins\hiscore)
history.dat: Arcade History
languages.ini: AntoPISA's progetto-SNAPS
mameinfo.dat: MASH's MAMEINFO
mamescore.ini: MAMESCORE

mess.ini: AntoPISA's progetto-SNAPS (part of version.ini)
messinfo.dat: AntoPISA's progetto-SNAPS
monochrome.ini: AntoPISA's progetto-SNAPS
nplayers.ini: Nplayers
screenless.ini: AntoPISA's progetto-SNAPS
series.ini: AntoPISA's progetto-SNAPS
story.dat: MAMESCORE
sysinfo.dat: Progetto EMMA
version.ini: AntoPISA's progetto-SNAPS

NU.