# Liquid War 6

A unique multiplayer wargame
Documentation for version 0.0.13beta codename “Blackbeard” stamp 2950
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Liquid War 6, a unique multiplayer wargame.

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# 1 Introduction

Read this chapter to discover Liquid War 6.

## 1.1 In a nutshell

Liquid War 6 is a unique multiplayer wargame. Your army is a blob of liquid and you have to try and eat your opponents. Rules are very simple yet original, they have been invented by Thomas Colcombet. It is possible to play alone against the computer but the game is really designed to be played with friends, on a single computer, on a LAN, or on Internet.

An older version, Liquid War 5, is available, but is not part of the GNU Project. Only Liquid War 6 is part of the GNU Project, it is a complete rewrite.

The official page of Liquid War 6 is `http://www.gnu.org/software/liquidwar6/`. For more information, you can read the Wikipedia article about Liquid War.

## 1.2 Project status

### 1.2.1 What works, and what does not (yet)

As of today, the game is in beta state. It can be installed, and you can toy arround with. You can even play with. It is still far from being complete as some key features are still missing.

What works:

- The whole framework is here, some functions are not implemented yet, but the bases are set up, and they are believed solid. The game is very modular, and is fully threaded. It is designed so that graphics, sound, network and bot backends can be hacked at will. It has a complete self-test suite, many debugging built-in tools, and is regularly checked with automated tools. For instance, you can check reports concerning global references, code coverage and cyclomatic complexity. This is not a quick hack.
- Documentation. Yes, you're reading it.
- Version 0.0.7beta is playable. Local game between humans (up to 4 players) is possible. Two bots are implemented, named random and stupid. No great players but well, they move the cursor. A new "deatchmatch" mode, different from LW5, is in place.
- Liquid War 6 already has some features which are nowhere to be found in Liquid War 5, such as multiple layers. It can be worth the upgrade.
- Maps. A number of interesting maps have already been designed (thanks to Kasper Hviid).
- The game runs natively on GNU/Linux and has been ported to Microsoft Windows and Mac OS X. Binaries are available for all those platforms. Use at your own risk. If in doubt, get the source and compile.

In the near future:

- Network play. Top-level priority. Yes, network has been promised for months (years?) and is still not there. I said "when it's done".
- Fix bugs ;) The current engine is somewhat buggy, fighters might loose the cursor, it clearly needs polishing.

In the long run:

- Write new graphical backends so that the game does not require Mesa or any OpenGL-like subsystem. The idea is to get rid of the 3D-accelerator dependency.
- Implement all the fancy 3D features, make it possible to play Liquid War 6 on a Moebius ring.
- Use the cool features of CSound to provide dynamic, contextualized sounds & musics.
- Optimize the bot algorithm, which is probably a complex AI problem.

You might be interested in checking the following URLs, which give a view on opened tasks and bugs:

- bug list: `http://savannah.gnu.org/bugs/?group=liquidwar6`
- task list: `http://savannah.gnu.org/task/?group=liquidwar6`

### 1.2.2 What has changed since Liquid War 5.x?

Liquid War 6 is a complete rewrite of Liquid War 5. The rewrite started in 2005. So a good question is "was the rewrite worth it?"...

Here's a list of key improvements:

- appearance, global rendering quality. Call it the way you want, Liquid War 6 simply looks nicer than any previous release. Period.
- level features, including multi-layer (allowing the map designer to create bridges and tunnels), wrapping (fighters disappearing on the left can reappear on the right). Those really change the gameplay.
- deathmatch mode. Give it a try, it's now the default mode, and definitely changes the rules.
- team profiles, as well as special "weapons", which are tricks you can play on opponents.
- modularity, overall code quality. While this is not a user-visible change, the game is far less monolithic, therefore hacking to revamp the graphics engine, the algorithm, whatever, is easier. The situation has changed from "this is impossible to hack" to "OK, how much time can this take?". So while one can't promise every idea will be implemented some day, at least many more things become possible with the new codebase.

The most interesting change is still to come, and concerns network games.

Stay tuned.

### 1.2.3 Revision history

Liquid War 6 releases are "codenamed" after famous, historical, real or mythical characters. Here is a short revision history. For details, see the `ChangeLog` and `NEWS` files distributed with the game. Additionnally, there's an ever-increasing "stamp" number which is incremented each time a build is done with a different source.

- 2006-12-18 : 0.0.1beta
- 2007-09-07 : 0.0.2beta
- 2008-01-30 : 0.0.3beta, codename "Napoleon", stamp 549
- 2008-09-19 : 0.0.4beta, codename "Clovis", stamp 756

- 2008-12-20 : 0.0.5beta, codename “Henri IV”, stamp 1082
- 2009-01-10 : 0.0.6beta, codename “Cesar”, stamp 1124
- 2009-10-03 : 0.0.7beta, codename “Geronimo”, stamp 1465
- 2010-07-05 : 0.0.8beta, codename “Attila”, stamp 1658
- 2010-08-23 : 0.0.9beta, codename “Chuck”, stamp 2096
- 2011-07-29 : 0.0.10beta, codename “Gengis Kahn”, stamp 2562
- 2011-10-02 : 0.0.11beta, codename “Ho Chi Minh”, stamp 2785
- 2011-12-18 : 0.0.12beta, codename “Aguirre”, stamp 2938
- 2011-12-24 : 0.0.13beta, codename “Blackbeard”, stamp 2950

### 1.2.4 Road map

The game will probably be labelled “6.0.0” when network mode is up and running. Until then there will probably be other improvements concerning gameplay and appearance (“eye candy”). There’s a balance to keep between the major goals such as “make that network thingy work” and the very real fact that “hacking must be fun”.

## 1.3 How you can help

### 1.3.1 Help GNU

Please remember that development of Liquid War 6 is a volunteer effort, and you can also contribute to its development. For information about contributing to the GNU Project, please read How to help GNU.

### 1.3.2 Todo list

Here’s a short list of todo items. It is probably too early to start hacking the core engine itself, for it is still under heavy development, might undergo major rewrites, and it’s hard for documentation to keep up with the reality of the code. However, there are still many things to do.

- Try the game. Play. Test. Send bug reports. Without bug reports, bugs don’t get fixed.
- Write maps. Obviously, this is something which can perfectly be delegated. Experience shows user-contributed maps are, on average, better than maps conceived by the author...
- Translate texts. Liquid War 6 uses GNU gettext, so all messages can be translated.
- ...any help is welcome.

Feel free to join the mailing-lists, this is clearly the best place to start with.

There’s also a list of opened tasks on Savannah at `http://savannah.gnu.org/task/?group=liquidwar6` which you can browse online. Maybe there’s some task for you!

Alternatively, you can contact Christian Mauduit.

# 2 User's manual

The Liquid War 6 user's manual hopefully contains any usefull information to install the program and play the game. If you just want to enjoy Liquid War 6 without diving into map creation and programming, this is just for you.

## 2.1 Mailing lists

### 2.1.1 General discussion

The main discussion list is <help-liquidwar6@gnu.org>, and is used to discuss all aspects of Liquid War 6, including installation, development, game strategies, and whatever subject players and hackers might want to talk about, provided it is Liquid War 6 related. If you don't know on which list to subscribe, this is the one.

To subscribe to it, please send an empty mail with a Subject: header line of just "subscribe" to the `-request` list, that is <help-liquidwar6-request@gnu.org>.

You can also subscribe to the list using the Mailman web interface for help-liquidwar6 and consult help-liquidwar6 archives.

### 2.1.2 Announcements

Announcements about LiquidWar 6 are made on <info-liquidwar6@gnu.org>. Subscribe to it to be informed of major releases, and other significant news.

To subscribe to it, please send an empty mail with a Subject: header line of just "subscribe" to the `-request` list, that is <info-liquidwar6-request@gnu.org>.

You can also subscribe to the list using the Mailman web interface for info-liquidwar6 and consult info-liquidwar6 archives.

Please also consider reading the latest news on Savannah.

### 2.1.3 Bugs

There is also a special list used for reporting bugs, <bug-liquidwar6@gnu.org>. Please try and describe the bug as precisely as possible. The more accurate the description, the more chances it will get to be fixed.

While this is the standard GNU way of reporting bugs, modern SPAM standards make it very hard to filter real bug reports from junk on this list. It is more convenient to use a web interface, the URL is: `http://savannah.gnu.org/bugs/?func=additem&group=liquidwar6` and you're really encouraged to use it instead of sending emails.

Please take a look at the bug list before submitting new bugs.

## 2.2 Getting the game

### 2.2.1 Download source

Liquid War 6 can be found on `http://download.savannah.gnu.org/releases/liquidwar6/` and `http://www.ufoot.org/download/liquidwar/v6/`.

Downloading the latest file from this place, and compile it yourself on your computer with a classical `./configure && make && make install` is the recommended way to install Liquid War 6.

### 2.2.2 Download binaries

Some binary packages might be available. Your mileage may vary.

GNU/Linux based systems are supported, through Debian `.deb` and Red Hat `RPM` packages. There is also a Microsoft Windows installer.

However these binaries are not necessarly available for every single version of the game.

### 2.2.3 GIT repository

Latest work in progress versions can be obtained with GIT. Here's the typicall command which will fetch the latest version:

```
git clone git://git.sv.gnu.org/liquidwar6.git
```

If you are behing a firewall and can't use the native GIT protocol, you can rely on the (slower) http protocol:

```
git clone http://git.sv.gnu.org/r/liquidwar6.git
```

You can browse the code online, consult log summary, and in a general manner "follow" the project on `http://git.savannah.gnu.org/gitweb/?p=liquidwar6.git` and `http://git.savannah.gnu.org/cgit/liquidwar6.git`.

### 2.2.4 Daily snapshots

Alternatively, you can download daily snapshots on `http://www.ufoot.org/liquidwar/v6/snapshots/` These files should be built every day, but a `make distcheck` is done before creating them. So if the source code is, for some reason, broken, then they won't be generated. It is a good source if you want the most up-to-date code which is not completely unstable. This is typically the place to go if you want to know a reported bug is correctly fixed. Please do not rely on snapshots generated on the fly by the source content manager, daily snapshots mentionned above are better since a `make dist` has been run on them. Using a checkout is really for developpers.

## 2.3 Installation

This section covers installation from source. Other ways of installing the program are not described here.

### 2.3.1 Requirements

All these libraries are mandatory to compile the game. Liquid War 6 won't compile, let alone run, without them. Some of them could probably be replaced by equivalent tools, but this would certainly require a programming effort and some changes in Liquid War 6 source code.

- GCC. Liquid War 6 does require the GNU C Compiler to build, while other compilers might be able to build the game, this is untested.
- Gomp. Liquid War 6 uses OpenMP `#pragma` directives, this should help the game run faster on SMP systems.
- GNU Make. Liquid War 6 might and certainly does use GNU Make extensions.
- GNU C library. Sounds obvious, but you need a standard C library. It happens that glibc has some rather usefull extensions (yes, as of 2006, some vendors continue to

offer C libraries without `snprintf`...) and Liquid War 6 might use them. In a general manner, Liquid War 6 is part of and designed for GNU. You might however manage to compile it with limited libc support, this is the case with mingw32 for instance but, do it at your own risk.

- Perl. Some Makefile commands require Perl. You don't need any Perl devel packages, and you can probably use any Perl 5.x version, since no fancy recent feature of Perl is used. Just plain Perl.
- Guile. Possibly the most required library, since Liquid War 6 is a scheme program which uses a set of functions coded in standard C. You need at least Guile 1.8.
- GNU MP. GMP is a free library for arbitrary precision arithmetic, required by Guile.
- libgc. This is a a garbage collector library, recent versions of Guile might require this so in case your version of Guile requires it, then Liquid War 6 will need it too.
- ltdl. This library, which comes with libtool, provides a portable alternative to `dlopen` and `dlclose`. Check that you have a `/usr/include/ltdl.h` file, or install the corresponding package.
- zlib. Required by other libraries, but can also be used directly by Liquid War 6 to compress network messages for instance.
- expat. Used to read and write XML files, which contain constants and configuration data.
- libpng. Liquid War 6 uses libpng to read levels (maps), not to speak of other optional libraries (SDL and the rest) who need it themselves.
- libjpeg. Maps can also be provided as jpeg files, so libjpeg is required as well.
- SQLite 3. Used to handle the list of available servers.

### 2.3.2 Optional libraries

While all these libraries are theorically optional (the game will successfully compile without them), you'll obviously need, for instance, one graphics backend. Otherwise, you'll simply have no display. This is not acceptable. As of today, one can reasonnably consider all SDL-related libraries are required. The rest is truely optional.

- ncurses. Required by readline, needs to be there otherwise readline might not be detected properly on some systems.
- GNU readline. Used to handle input on the console. Console is not absolutely mandatory, but it's a must-have if you want to hack the game. Console unavailable does not mean you won't get anything on stdout but, the interactive script shell just won't work.
- GTK+. Used to display error/critical messages, so that users who launch the game by clicking on a icon (that is, not from the console) are still visually informed of important messages.
- Mesa. This library provides an API similar to OpenGL and enables 2-D and 3-D drawing.
- SDL. SDL is used to set up a working OpenGL environnement, and handle input (mouse and keyboard).
- SDL_image. This SDL extension is used to read textures and other graphics from disk.
- FreeType 2. This library is required by SDL_ttf, to draw fonts.

- SDL_ttf. This SDL extension is used to draw fonts. It is UTF-8 enabled.
- libcsound. While this tool is not used yet, it is meant to be the final sound backend, as CSounds offers great power to the composer, enabling truely dynamically generated sound & music. For now Liquid War 6 tries to detect csound 4 but as the mainstream stable release is now 5 an update is needed. It will probably be updated/fixed (Liquid War 6 using csounds 5) some day, for now you can safely *not* install csound on your system and enjoy all the possibilities of the game.
- SDL_mixer. This SDL extension is used to allow dynamic mixing of sounds, and it also provides a builtin `OGG/Vorbis` file renderer.
- libcURL. Used to handle HTTP requests, the idea being not to re-invent the wheel but use a robust standards-compliant generic library.

### 2.3.3 Installing requirements using RPM/DEB packages

You might find it convenient not to install all the requirements from source, but use your favorite GNU/Linux distribution packages.

On an RPM based GNU/Linux system, a typical command (tested with Fedora 15 "Lovelock") could be:

```
yum install \
make gcc glibc glibc-devel binutils \
libgomp \
guile guile-devel gmp gmp-devel libgc1c2 libgc-dev \
libtool libtool-ltdl libtool-ltdl-devel \
zlib zlib-devel expat expat-devel \
libpng libpng-devel libjpeg libjpeg-devel \
sqlite sqlite-devel \
ncurses ncurses-devel readline readline-devel \
libGL libGL-devel libGLU libGLU-devel \
SDL SDL-devel SDL_image SDL_image-devel \
SDL_mixer SDL_mixer-devel \
freetype freetype-devel SDL_ttf SDL_ttf-devel \
libcurl libcurl-devel \
perl lcov global valgrind graphviz gv texinfo-tex \
gtk2-devel rpm-build
```

On a DEB package based GNU/Linux system this command (tested with Debian 6.0 "squeeze") would be:

```
apt-get install \
make gcc libc6 libc6-dev binutils \
libgomp1 \
guile-1.8 guile-1.8-dev guile-1.8-libs libgmp3c2 libgmp3-dev \
libtool libltdl7 libltdl-dev \
zlib1g zlib1g-dev libexpat1 libexpat1-dev \
libpng12-0 libpng12-dev libjpeg8 libjpeg-dev \
libsqlite3-0 libsqlite3-dev \
libncurses5 libncurses5-dev libreadline6 libreadline6-dev \
libgl1-mesa-glx libgl1-mesa-dri libgl1-mesa-dev libglu1-mesa libglu1-mesa-dev \
```

```
libsdl1.2debian libsdl1.2-dev libsdl-image1.2 libsdl-image1.2-dev \
libsdl-mixer1.2 libsdl-mixer1.2-dev \
libfreetype6 libfreetype6-dev libsdl-ttf2.0-0 libsdl-ttf2.0-dev \
libcurl4-gnutls-dev \
perl lcov global valgrind graphviz gv \
texinfo texlive-base texlive-generic-extra \
libgtk2.0-dev debhelper
```

Note that those requirements really depend on the exact distribution you have, package names may vary from one to another.

### 2.3.4 Compiling

Liquid War 6 uses GNU Automake, Autoconf and GNU Libtool.

Once all the requirements are installed, run:

```
./configure
make
make install
```

Liquid War 6 supports the standard `./configure --prefix=/my/path` option (in fact, it supports much more than that) so you can install the game in any directory. You do not need to be `root` to install Liquid War 6.

## 2.4 Extra maps

### 2.4.1 The extra maps package

The main package contains some maps so that you can try out the game. Still, an additionnal package, called `extra-maps` or `liquidwar6-extra-maps` is available, containing more maps. It really does contain many of them, including most Liquid War 3 and Liquid War 5 legacy maps, plus new Liquid War 6 maps.

### 2.4.2 Install extra maps on GNU/Linux and POSIX systems

On GNU/Linux systems (and possibly any POSIX unixish system) running:

```
./configure
make
make install
```

will install the extra maps on your system automatically, they will then be available in the `extra/` sub-directory when browsing maps.

The `./configure` script has a `--enable-liquidwar6` switch which will try and find automatically if there's an existing `liquidwar6` binary in the path. If there's such a binary, it will run it and ask for its `map-path` and use this value automatically.

### 2.4.3 Raw install of extra maps (all-platforms)

Another solution, which works on all platforms including Microsoft Windows and Mac OS X but also works on GNU/Linux, is to simply unpack the `extra-maps` package (unzip or untar) in your custom map directory, or in the system map directory. There's nothing else to do to install these maps but simply put them on your hard drive in the right directory.

Typically on an Microsoft Windows system, you would unpack the extra maps in `C:\Program Files\Liquid War 6\map\` (system directory) and on a Mac OS X system you would unpack the extra maps in `Liquid War 6.app/Contents/Resources/map/` (system directory) or `$HOME/Library/Application Support/Liquid War 6/map` (user directory). On a GNU/Linux or POSIX system you would unpack them in `$HOME/.liquidwar6/map/` (user directory).

Next time you run the game, the maps should be browsable.

If you can't see them, run `liquidwar6 --audit` and check that the place where you unpacked the files is actually searched by the binary.

## 2.5 Troubleshooting

### 2.5.1 Compilation problems

A quick survival guide:

- Check that you have all dependencies installed. Also check their version number. Double-check that you have devel packages installed, not only run-time binaries.
- Read carefully the output of `./configure`. Running `./configure > configure.log 2> configure.err` does help.
- Editing `/etc/ld.so.conf` and running `ldconfig` as `root` can help if some dependencies are installed in exotic places.
- Check the values of the environment variables `CFLAGS`, `LDFLAGS` and `LD_LIBRARY_PATH`.
- Try `./configure --enable-allinone`, this will disable some fancy but somewhat complicated dynamic `.so` file support, it can help if shared libraries are handled differently on your system than on a plain GNU/Linux box.

If none of these help, consider reporting a bug, or search the mailing-lists for help.

### 2.5.2 Check installation

Here's a check-list to ensure that your installation is correct:

- What was the output of `make install`? `make check`?
- Is the `liquidwar6` binary in your `PATH` environment variable? It might be in `/usr/games`.
- Run `liquidwar6 --pedigree`. Look at the output. Check the compilation date & time, the version number.
- Run `liquidwar6 --audit`. What do these paths look like? Are they absolute paths? Do they exist? What's there? Normally, once the game is installed, all of them should exist, and be populated with sub-directories and files.
- Run `liquidwar6 --modules`, to know which modules where compiled. You need at least one graphical module, for instance `mod-gl`, else the game won't run.
- Run `liquidwar6 --host`, this displays informations about the host system the binary has been built for.

### 2.5.3 Problems running the game

Now, game looks correctly installed, but you have problems running it.

- Run the game from a terminal, not from a Gnome or KDE launcher, you need to see the console output.
- In the `$HOME/.liquidwar6/` directory, you'll find some files, the main log file `log.csv` and maybe `dump.txt` or `backtrace.txt`. They might contain valuable information, read them. Note that while `log.csv` is overwritten each time you start the game, `dump.txt` or `backtrace.txt` are conserved until a new problem arises. So check the date of these files to be sure you're analyzing the right ones. Note that byt default on Microsoft Windows `$HOME/.liquidwar6/` is replaced by `C:\Documents and Settings\<username>\Liquid War 6` and on Mac OS X it is in `/Users/<username>/Library/Application Support/Liquid War 6/`.
- Run `liquidwar6 --defaults`. This will reset all options to defaults. You might need to run this when upgrading from a version to another, since some options might appear, disappear, or defaults values can change.
- Run `liquidwar6 --test`. This should run a complete test suite, many functions in the game will be tested automatically, and errors reported.
- Run `liquidwar6 --show-script-file`. Are you really running the right code?
- Game segfaults: try `make uninstall && make clean && make && make install`. Many problems can come from using a wrong shared module. You can also launch the game with the `--trap-errors=false` switch, this will disable the custom popup window and allow you to get the real error.
- Game (still) segfaults: try `gdb liquidwar6`. Type `run --trap-errors=false` and watch output.
- The dynamic library loader can sometimes have problemes, and does not always report explicit messages on `stdout` or `stderr`. You can change this by modifying some environment variables: `export LD_DEBUG=all`. This is very verbose but does help finding bugs.
- Consider compiling the game using `./configure --enable-valgrind` and then run it using Valgrind.
- Try `find / -type d -a -name "liquidwar6*" 2> /dev/null` to ensure you don't have an old version of Liquid War 6 somewhere else...

## 2.6 Quick start

### 2.6.1 Quick start

Once the game is installed, run it, click on `Quick start` with the mouse, and control the red `'a'` cursor with the mouse, or keyboard, both work. Try and surround the green team, it's a stupid bot, you should win ;)

You army is formed by all the red pixels on the screen, they should try and rejoin the cursor (the blinking `'a'` letter) using the shortest path. When red and green meet, they fight. Try it, toy arround.

The `Quick start` button will always make you play red against a green stupid bot, whatever other options you have set up.

Todo...

## 2.7 Strategy tips

## 2.8 User interface

### 2.8.1 A reduced set of keys

Liquid War 6 can be controlled using a reduced set of keys. This is to make the game more portable and allow possible ports to platforms where a full keyboard is not available. Depending on the graphics backend, exact mapping might change, they should hopefully be obvious and intuitive.

Those keys are:

- `up` : the arrow up key
- `down` : the down arrow key
- `left` : the left arrow key
- `right` : the right arrow key
- `enter` : the enter / return key
- `esc` : the escape key
- `ctrl` : the control key
- `alt` : the alt / meta key
- `pgup` : the page up key
- `pgdown` : the page down key

Basically,

### 2.8.2 Combining mouse, keyboard and joysticks

It's also possible to control the game with the mouse only, or with a joystick. By default the interface will trap all events and respond on any of these possible devices.

| **Keyboard** | **Mouse** | **Joystick** | **Menu action** | **In-game** |
|---|---|---|---|---|
| `up` | mouse pointer | stick | previous menu item | move cursor up |
| `down` | mouse pointer | stick | next menu item | move cursor down |
| `left` | mouse pointer | stick | change menu item value | move cursor left |
| `right` | mouse pointer | stick | change menu item value | move cursor right |
| `enter` | left-click | button A | validate menu | validate chat line |

| | | | | |
|---|---|---|---|---|
| `esc` | right-click | button B | back to previous menu | quit game |
| `ctrl` | right-click or double-click on any button | button C | N/A | fire |
| `alt` | middle-click or triple-click on any button | button D | N/A | alternate fire |
| `pgup` | wheel up | button E | previous menu item | zoom in |
| `pgdown` | wheel down | button F | next menu item | zoom out |

A final word about joystick buttons: there's no such thing as standard joystick buttons, some will come with `A,B,C,D`, others will have `A,B,start,select,L,R`, there's no way to know. By default, the game will use the buttons with the lowest indexes (returned by your driver) for the most usefull functions. Validate menu entries is the most usefull action, zooming in and out the one you can live without.

### 2.8.3 Quit with F10

There's also an (almost) hardcoded shortcut which will quit the game immediately, or at least as quickly as possible, without any prompt or warning.

It is the `F10` key.

Think of this feature as the procastinator's "whoops, here comes my boss!!!" emergency function.

## 2.9 Solo game

### 2.9.1 Current state

As of today, Liquid War 6 is essentially a solo game since network is not working. It allows you to toy arround in arcade mode on any map you wish.

A real solo mode with campaign and goals to reach is planned, how it will be implemented is yet to be defined.

### 2.9.2 Team profiles

By default, teams behave differently, some of them move more rapidly, some are more aggressive but vulnerable, some are more defensive but do not attack as strong as others. This aspect of the game is under active tuning, things might be unfair by now, you can toy arround with the various `team-profile-...` options, any report is appreciated.

Note that this is very different from Liquid War 5, and can give very different gaming experiences, you can artificially set up arbitrary strong bots, for instance.

Here's a description of the default color settings:

- `blue`: has a strong attack but is slow
- `cyan`: has an extremely good defense but is slow
- `green`: has a better defense than the average

- `lightblue`: has an extremely strong attack but is very slow
- `magenta`: is extremely fast but also very vulnerable
- `orange`: is fast, but has a very weak attack
- `pink`: has a very strong attack, but is also very vulnerable
- `purple`: has a very good defense but a weak attack
- `red`: moves faster than the average
- `yellow`: has a strong attack

### 2.9.3 Weapons

Additionnally, when profiles are used, each team has two weapons, a primary weapon and an alternate one. Think of weapons as special (usually nasty) tricks you can play on your opponents.

Here's a description of available weapons:

- `atomic`: nuclear explosion, all fighters arround your cursor are about to die
- `attract`: all fighters from all teams are packed near your cursor
- `berzerk`: super-strong attack for a limited time, crush your enemies
- `control`: you take the control of all other teams while your cursor stays in place
- `crazy`: all your opponents go crazy for some time, acting with no logic
- `disappear`: you disappear for some time from the battlefield, to reappear later, somewhere else
- `escape`: fighters placed as far as possible from cursor, magically escape from any grip
- `fix`: all other teams are freezed, you can move but not attack them
- `invincible`: no damage for a limited time, move untouched
- `kamikaze`: you die along with the strongest team on the battlefield, requires at least 3 teams
- `mix`: fighters exchange position, their properties being preserved
- `permutation`: will exchange colors, randomly, requires at least 3 teams (double edged weapon)
- `plague`: general disease, all fighters mysteriously loose health
- `reverse`: fighters continue to move normally, but attacks are done in reverse mode, backwards
- `rewind`: make the battlefield be like it was a few seconds ago
- `scatter`: every fighters of every team scattered in random places
- `shrink`: reduces the number of fighters on the map
- `steal`: steals some fighters to other teams
- `teleport`: fighters placed as close as possible to cursor
- `turbo`: move faster for a limited time

Note that this is in progress, some of them are NOT IMPLEMENTED YET.

## 2.10 Network games

### 2.10.1 Choose your "public url"

Liquid War 6 needs to name your "node" (you can think as your server instance of the game) and have a unique URL (address) to publish and give to other nodes.

If only one network adapter is attached to your computer and your address IP is `A.B.C.D` then by default the game will pick automatically the address `http://A.B.C.D:8056/` and it should work flawlessly.

Problems can arise if you have a peculiar network configuration, if you have multiple non-loopback network interfaces, if you use NAT to protect yourself from intruders and/or if your context forces you to do so. In that case, Liquid War won't be able to guess a correct URL automatically. So you need to set it up manually either by editing the `public-url` entry in the config file, changing environment variable `LW6_PUBLIC_URL` or passing the `--public-url=http://<host>:<port>/` argument when running the game. Typically, if you are behind a firewall which does NAT, use the firewall address. The right address is the address which, given to remote hosts, will allow them to connect on your game instance.

### 2.10.2 Starting a node

A node is started automatically when you run the game. Even if you don't start to play, node starts in the background and exchanges data with other nodes, mostly to discover them and maintain its internal map of existing nodes and games.

So even without starting a network game, you should be able to point a web browser on your node and see a web page describing it. Your node address is displayed on `stdout` (console) when starting the game. If in doubt, try `http://localhost:8056/` which should work unless you modified defaults settings.

When you start a network game, the program simply changes your node state from "idle" to "accepting connections".

### 2.10.3 Connecting to a node

The interface should show you the list of available nodes, just pick one and try and connect to it.

Note that once you're connected on a remote node, you're still acting as an independant node, and other nodes might connect to your node as well as to the other nodes. In short, there's no real server or client, everyone is a client for someone, and can act as a server.

Nodes connected together form a "community", which can disband, accept new nodes, and in a general manner has its own immaterial life, the first node which created the game might disappear, game can continue without it.

This is why the main network module is called `libp2p`, this is a reference to the term "peer to peer".

### 2.10.4 Communities

Once a node is connected to another one, they've started a "community". Formally, a stand-alone node accepting for connection is already a community, even if it has only one member, but the only really interesting communities are those formed with several nodes.

A community can't be reached through a given server, to connect to one you just need to connect on one of its member nodes. All nodes are equivalent, there's no master, no root node, nodes collaborate to share the same real-time information and maintaine an up-to-date game state.

Of course, conflicts can arise, and in that case nodes need to agree on an acceptable solution. Normally, the program takes decisions automatically (for instance, it could decide to "kick" a node out of the community) so the player does not have to care about this, but this is expected to be one of the most tricky (and passionating) part of Liquid War 6 hacking.

### 2.10.5 Firewall settings

By default, Liquid War 6 will communicate on port 8056, in both TCP and UDP, and in both ways too (in/out). It's possible to play with partial connectivity, in extreme case, you can even play without direct internet access, using only a mere web proxy.

However, things will go faster and be much easier if the program can use its default native protocol.

Here's an example of a typicall iptables configuration which allows you to play the game full-featured. It's assumed that by default all packets are dropped, this configuration will just open the necessary ports.

```
# outgoing TCP on port 8056 (liquidwar6)
iptables -A OUTPUT -p tcp --dport 8056 -m state --state NEW,ESTABLISHED -j ACCEPT
iptables -A INPUT -p tcp --sport 8056 -m state --state ESTABLISHED -j ACCEPT
# incoming TCP on port 8056 (liquidwar6)
iptables -A INPUT -p tcp --dport 8056 -m state --state NEW,ESTABLISHED -j ACCEPT
iptables -A OUTPUT -p tcp --sport 8056 -m state --state ESTABLISHED -j ACCEPT
# outgoing UDP on port 8056 (liquidwar6)
iptables -A OUTPUT -p udp --dport 8056 --sport 1024:65535 -j ACCEPT
iptables -A INPUT -p udp --sport 8056 --dport 1024:65535 -j ACCEPT
# incoming UDP on port 8056 (liquidwar6)
iptables -A INPUT -p udp --dport 8056 --sport 1024:65535 -j ACCEPT
iptables -A OUTPUT -p udp --sport 8056 --dport 1024:65535 -j ACCEPT
```

If you can't change firewall settings and only have access to the web through a web proxy, it can still be possible to play (with some restrictions such as your node not being seen by others) if `mod-http` is available. This in turn depends on wether libcurl support was activated when compiling the game. To use the proxy, you can set the `http_proxy` environment variable. For detailed informations, please refer to libcurl doccumentation.

### 2.10.6 Is the game secure?

As stated in the license, the program comes with NO WARRANTY. Period.

However, an important effort has been made so that it can reasonnably be used online, exposed to various "common" attacks.

As far as security is concerned, there are two different issues:

- vulnerability to general security attacks, people typically trying to gain prililedged access on your computer, relying on a security flaw in the program. A good firewall is

a must-have, as you can never know for sure a program has no bugs. Running Liquid War 6 as an unpriviledged user (certainly not "root") is also a good practice.

- vulnerability to players "cheating" and sending malicious informations to fake their moves, scores, and/or modify informations concerning other players. This is a very important point in Liquid War 6 since it has a multi-channel way of exchanging data (think of the web interface, you have no garantee of who the client is).

Here's a list of various steps which have been taken to make the program more secure:

- a `--skip-network` option is here if you really do not want to be bothered by networking risks;
- program has basic password support so that you can deny access to unknown players;
- passwords are never sent in clear text over the network, only a hash (checksum) is sent;
- no use of well-known buffer overflow friendly functions like `strcpy`, equivalents such as `strncpy` are used;
- program never trusts what comes from network peers, when it wants to know something, it checks it out by itself, for instance, the node list is systematically verified by the local node before being used and/or published;
- the built-in web server is not a general purpose web server which will end up revealing some of your private files, it can only serve game-related pages;
- the very fact that the game has no central server makes it hard to attack it, because if someone wants to play "Oscar" annoying "Alice" and "Bob" he well need to fool all the nodes participating in a game, sending wrong informations to a single node won't have much effect.

This being said, Liquid War 6 does not use any strong encryption library to protect the data it sends. All the checksum machinery might be vulnerable to a brute-force and/or strong cryptographic attack, so in theory it's possible to fool the program.

In practise, if you want real privacy, play over a VPN (Virtual Private Network).

## 2.11 Graphics

### 2.11.1 Standard, high and low resolution

Liquid War 6 will try and pick up a default resolution when the game is launched the first time. It won't use your maximum screen resolution but will instead list all available fullscreen modes, and pick up one which is usually something like two thirds of the highest mode. This is to allow switching back and forth between fullscreen and windowed mode using the same settings. This automatically picked-up resolution really depends on your hardware and driver. It is called "standard" in the graphics options menu.

Then it is possible to automatically select the minimum and maximum resolution your hardware allows in fullscreen mode. These are called "low" and "high" in the graphics options menu. Just click on the button that display the resolution, it will change and use the next setting. In windowed mode, the game won't accept the highest available mode but will instead use a percentage of it, defined by the `--windowed-mode-limit` parameter.

You might still be in a case where this is not enough. For instance your maximum resolution is 1600x1200, Liquid War 6 picks a default mode of 1280x960 for you but for some

reason you want to play in 800x600, fullscreen. In this case, simply switch to windowed mode, resize the window with the mouse (the resolution button will show you the current resolution) and just choose a resolution near 800x600. It does not even need to be exactly 800x600, 798x603 would probably fit. Then when switching back to fullscreen, you'll be in 800x600, the game will automatically pick up the fullscreen mode which is closest to the current windowed mode resolution.

### 2.11.2 Display rate

By default the game will try and run at 60 frames per second. Given the nature of Liquid War 6, this is probably enough. Higher values will maybe give a slightly smoother display, but barely noticeable.

You can activate the display of frames per seconds (aka "fps") through the menu ("options -> system") or with the command line ("–display-fps").

On a single processor system, reducing the number of frames per second might allow the rest of the game run faster. So if you notice the game is really slow, in terms of "fighters move slowly" then you might be happy reducing the display rate and therefore giving power back to the other parts of the program. On a dual-core (or more) or on a multi-processor system, this is probably useless since the game is threaded and has a dedicated thread for display purposes. The command line option to reduce the number of frames per second is `--target-fps`.

Additionnally, the parameter `--gfx-cpu-usage` allows you to force the display thread to "take a rest" and go idle for some time. This is advanced settings, most users won't touch this.

## 2.12 Sound & music

### 2.12.1 Current status

As of today, the game is capable of playing Ogg Vorbis audio files. That's it.

### 2.12.2 The future

In the long run, what is planned is to support Csound which would allow very cool effects, such as dynamically changing the music while the game is running, typically following the action. If there's a lot of fight, the music could reflect this.

For now this is only vaporware, just a nice idea among others, nothing implmented yet.

## 2.13 Config file

The config file is a simple XML file. It uses XML only to benefit standard parsing tools, but it's not a structured XML file, in the sense that the tree is so simple that all items are at the same level. It is just a simple key-value binding.

This file is in `$HOME/.liquidwar6/config.xml` on GNU/Linux and POSIX systems, in `C:\Documents and Settings\<username>\Liquid War 6\config.xml` on Microsoft Windows and in `/Users/<username>/Library/Application Support/Liquid War 6/config.xml` on Mac OS X.

You're free to edit it manually, but all parameters are changeable with command line options. The program will overwrite this file each time it exits, so if you put comments in

it, they will disappear. The advantage of this is that if you mispell something, or if for some reason the game does not understand a value, then when rewriting the file, it will show you it just did not get it.

The file embeds the documentation for all its entries, it is therefore rather verbose. The documentation is the same you will find online or by quering the game with the `--about` option, also the same you would get reading this manual.

## 2.14 Logs

Liquid War 6 uses `stdout` to output important messages, and `stderr` to log warnings and errors. It will also use syslog if available.

Additionnally, a verbose log is available in `$HOME/.liquidwar6/log.csv` on GNU/Linux and POSIX systems, in `C:\Documents and Settings\<username>\Liquid War 6\log.csv` on Microsoft Windows and in `/Users/<username>/Library/Application Support/Liquid War 6/log.csv` on Mac OS X.

You can read this using any spreadsheet software capable of reading csv file. It uses the tab (`\t`) character as a separator. It contains valuable informations including version and most default values for the game, and for each line logged, it says where in the code the log function was called. A must-have for debugging.

## 2.15 Report bugs

There are two ways to report bugs:

- send a mail to <bug-liquidwar6@gnu.org>;
- use the web-based Savannah bug tracker: `http://savannah.gnu.org/bugs/?func=additem&group=liquidwar6`.

The latter (Savannah) is much preferred, because the mailing-list is bloated with spam... It also offers a list of bugs which you should read before submitting a new one.

# 3 Hacker's guide

This hacker's guide is for anyone who is curious about the game, and wants to know how it works. It covers many aspects from simple map creation to technical program internals. A great effort has been done in Liquid War 6 so that it should be much more hackable than previous versions. Any feedback is welcome.

## 3.1 Designing levels

### 3.1.1 Why is level design so important?

As of Liquid War 5, most levels have been contributed by players. While the maintainer of Liquid War 6 has technical knowledge to develop the game, artistic talent and taste might not be his domain of excellence 8-)

Therefore contribution are truely welcomed when they take the form of a new, original, fun and good looking level. It's believed the levels often make the game much more than its engine. This is true for any type of game, and Liquid War is no exception.

So this section is here to help players understand how to hack existing levels, and create new ones, in the hope that 1) they can enjoy their own creations and 2) possibly share their work with others.

Note that this manual might refer to levels and maps: they are just two different names to describe the very same thing. It's an alias.

### 3.1.2 Format overview

Liquid War 6 stores level information in a plain directory.

There is no such thing as an opaque `.dat` binary file. The name of the level is the name of the directory itself, and its elements are the files contained in it.

Files must follow a precise naming scheme. For instance Liquid War 6 expects a `map.png` file to be present in each map directory.

All image files in a level use the Portable Network Graphics or JPEG format. It is possible that in the long term, Liquid War 6 will be able to handle levels as `.tar.gz` or `.zip` files. In that case these files will only be a compressed image of the actual level directory.

See the `./map/` directory of the source Liquid War 6 distribution to see example of maps.

### 3.1.3 Resolution (map size)

Liquid War 6 does enforce a limit on map size. This is not to frustrate map designers and/or players, simply, it would be a lie to pretend the game can handle arbitrary big maps.

They might look great on your computer but will become unplayable soon on an older machine. And most of the time they don't look that great, carefully crafted 1280720 just looks awesome and can represent a great level complexity.

Here are the technical limits:

| Type | Max width | Max height | Max surface |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Texture | 3 000 | 2 000 | 6 000 000 |
| Logical map | 1 500 | 1 000 | 1 000 000 |

The texture can be somewhat bigger than the logical map, this allows for pretty levels while limiting the horsepower needed to move the fighters and animate everything. Note that you could technically feed the game with a `map.png` that is bigger than the logical map limit, only it will be downscaled when being loaded.

The texture limits are generous enough to accept a full-HD 1920x1080 image, or a 4/3 1600x1200 image, while the "one million pixels" logical map limit is enough to store a 16/9 1280x720 map or a 4/3 1024x768.

Keep in mind that the logical map (`map.png`) will probably be scaled whatsoever, even if it's within the absolute limits (the game adapts the resolution to your computer speed) and your texture will rarely appear in its native resolution, will probably be distorted, and so on.

### 3.1.4 Metadata

Older versions of Liquid War 6 used to load a plain `README` file and use this as metadata. Title was take from map directory name. This is still supported, but it now also supports the addition of a `metadata.xml` file in which you can describe your map.

The following files can be defined:

- `title`: map title, what will appear in the menus
- `author`: map author
- `description`: description of the map, to help players when browsing folders
- `license`: map license (short version, just a simple one-liner, don't use lenghtly copyright notices here, the `README` file would be the file to put long legal sections)

### 3.1.5 map.png

This is the only required file in a level.

In fact, the existence of `map.png` makes a directory a level. When checking wether a directory is a correct level, Liquid War 6 simply tests the existence and validity of `map.png`.

This image is a simple black & white area, where white zones are the background, the sea, the places where fighters can move, and black zones are the foreground, the walls, the places where fighters can't go.

This informations can be stored in a 2-color indexed file, or in a grayscaled or even truecolor RGB file, but color information won't be used. Internally, Liquid War 6 will read the color of every point. If it is over 127 on a 0 to 255 scale, it will be considered as background, if it is below 127, it will be considered as foreground.

### 3.1.6 layer2.png ... layer7.png

Liquid War 6 can handle mutiple layer maps. Think of a pile of maps, one being on top of the other. This allows you to create a volume, the game considers every layer has two axis x and y, and the z axis is to travel through layers. First layer corresponds to z=0, second layer to z=1, and so on.

Here are the files you can use to define layers:

- `map.png` this one is on top, it's always defined (z=0)
- `layer2.png` (z=1)
- `layer3.png` (z=2)
- `layer4.png` (z=3)
- `layer5.png` (z=4)
- `layer6.png` (z=5)
- `layer7.png` (z=6)

A `layerX.png` file should be designed exactly like `map.png`. In fact, `map.png` could simply have been called `layer1.png`.

Up to 6 extra layers can be defined (from `layer2.png` to `layer7.png`). This is a hard-coded limit. It allows you to define 7 different layers, including the top `map.png` layer. Keep in mind this layer system is not real 3D, it's more a "2D and a half" model. Adding layers can considerably slow down the game, so it's wise to try and use as few layers as possible. Technically, 3 layers will allow you to build bridges and tunnels, which is probably the most usefull construction using layers. Fighters can also have difficulties navigating through layers so piling up layers in narrow "vertical" z-axis based tunnels is probably not a great idea.

The `ufoot/concept/pass` map of the `liquidwar6-extra-maps` demonstrates basic layer usage.

### 3.1.7 texture.png, texture.jpeg and texture-alpha.jpeg

It is possible to define a texture for the map by putting a `texture.png` or `texture.jpeg` file. It does not need to have the same dimensions as the map itself. Indeed, textures can be much more precise than the actual logical map.

There's no theorical limit on how big a texture can be, more precisely, it can be much bigger than any hardware/driver maximum texture size. In practice, a too big texture will waste your video card RAM, and slow everything down. Sizes ranging from 640x480 to 1600x1200 are reasonable texture sizes.

If you don't define this, the `map.png` file will be used as the texture, and also import colors from `style.xml` if defined.

Note that the shape of the texture defines the shape of the map, that is, the ratio with which it will appear on the screen.

The PNG alpha layer will be used for transparency. But to save disk space, it can be convienient to prefer the JPEG format, use `texture.jpeg` instead of `texture.png` and store the alpha layer in a separated file, called `texture-alpha.jpeg`. This avoids handling heavy PNG files, PNG compression not being performant on most textures.

In `texture-alpha.jpeg`, black is considered opaque, and white is transparent. Different levels of gray correspond to different levels of opacity. Previous versions of the game used the other way of doing things (black is transparent) because this is technically, the most obvious way to do things. Black is 0 and transparent is 0. But for a human "reader" of the map this does not make sense. One generally expects white to be the equivalent of "undrawn" or "blank", well, if it's undecided, void, transparent, whatever, it's white. When the Gimp flattens an image, it becomes white, not black.

So white is transparent. Period.

### 3.1.8 glue.png and boost.png

If there's a `glue.png` or `boost.png` file in the map directory (you can use one of them or both) then they will be interpreted as follow:

- on areas where `glue.png` and `boost.png` are white, nothing special happens, fighters follow their default behavior
- on areas where `glue.png` is black, fighters will be slowed down. How slowish they will be depends on the 'glue-power' parameter. If 'glue-power' is 3 then fighters will move three times slower.
- on areas where `boost.png` is black, fighters will behave faster. How fast they will be depends on the 'boost-power' parameter. If 'boost-power' is 2 then fighters will move two times faster.
- on areas where `glue.png` or `boost.png` are gray, they will be slowed down less or speeded up less depending on how dark the grey is.

There can be, at the same place, some gray or black in both `boost.png` and `glue.png`. How this will behave exactly is not really clear at this stage, the recommendation is not to do this (it does not really make sense anyway) but if you do it, game won't complain.

It's also wise not to abuse of `boost.png` for obviously, a map filled with "boosted" zones at a X10 pace will require much more CPU than the same map with no such setting. This might fool the automatic resampling algorithm and lead to maps that are unplayable. The spirit of `boost.png` is just to make a few spots go faster.

It's also important to note that behaving faster or slower means moving faster or slower but also attacking faster or slower, and, in a general manner doing any action with a different pace.

### 3.1.9 danger.png and medicine.png

If there's a `danger.png` or `medicine.png` file in the map directory (you can use one of them or both) then they will be interpreted as follow:

- on areas where `danger.png` and `medicine.png` are white, nothing special happens, fighters follow their default behavior
- on areas where `danger.png` is black, fighters die automatically, that is, they become black and loose health. How dangerous these zones are depends on the 'danger-power' parameter.
- on areas where `medicine.png` is black, fighters regenerate faster, they become bright and shiny as if auto-healing. How efficient this medicine is depends on the 'medicine-power' parameter.
- on areas where `danger.png` or `medicine.png` are gray, well, it's in between, the "danger" and "medicine" effect will be proportional to the level of gray.

There can be, at the same place, some gray or black in both `medicine.png` and `danger.png`. How this will behave exactly is not really clear at this stage, the recommendation is not to do this (it does not really make sense anyway) but if you do it, game won't complain.

### 3.1.10 one-way-<direction>.png

The four files:

- `one-way-north.png` (AKA "up")
- `one-way-east.png` (AKA "right")
- `one-way-south.png` (AKA "down")
- `one-way-west.png` (AKA "left")

can be used to force the fighters to go in one given direction, on some parts of the map. If an area is black on one of this meta-layers, then fighters will go in the given direction. For instance, a black zone in `one-way-north` will make fighters go to the north (AKA "up" direction) regardless of the cursor position. The fact that this is a one-way path is understood by fighters and they will take this in account when choosing the shortest path to go somewhere. You can combine vertical and horizontal one-way informations, making diagonal one-way paths.

### 3.1.11 cursor.png and cursor-color.png

By default, a simple cursor will be displayed, but you can use a custom per-map cursor. Cursors are defined by two 64x64 bitmaps:

- `cursor.png` is a PNG file, very likely to use transparency, which will be default be colorized according to the map colors. You can draw it any color, only greyscale informations will be used. You can keep the original colors if you really want to by setting `colorize-cursor` to false, but the default is to ignore the hue.
- `cursor-color.png` is another PNG file, very likely to use transparency too, which will always be colorized, replacing white by the team color, and black by the "dead" color, which by default is black and is usually a dark color. This colorization is a way to recognize your cursor and know which team it belongs to.

You can define only one of those bitmaps, if doing so, then the other layer will be empty, and won't be filled with the default cursor data. Note that additionnally, a little letter (single character) will be displayed using the team color, so that's yet another way to identify which teams the cursor belongs too. The PNG files really need to be PNG (JPEG won't work) and need to be 64x64, any other size will be ignored.

### 3.1.12 rules.xml

Whereas `style.xml` is only about the appearance of the map, `rules.xml` allows the map designer to change pretty much any parameter.

Ultimately, the player can still ignore these settings and overide them with its own values, but the idea is: most game options are only pertinent in a given context. For instance, on some maps it's interesting to move slowly, on some other it's interesting to move fast. Some maps might be playable packed with fighters everywhere, some other might be much more fun with almost nobody on them.

The approach in Liquid War 5 was to make the options available, but let the player himself find the right settings for the right map. The consequence is that no one ever used all those cryptic options in the advanced options menu, and probably 99% of the players ended up playing with default settings. This is not that bad, but given the fact that

changing a few parameters one can totally transform the gameplay, it has decided been that in Liquid War 6, the map designer suggests the right options that matches his map.

This does not prevent the player from toying with options himself, he can still do it.

There's also one important point to note: all these options are technically implemented as integer parameters. We certainly do not want any float here, since, and it is a Liquid War specific behavior, the game must be 100,00% predictable and behave the same on every platform. As there is nothing like exactness when speaking of floats, those are forbidden here. As for strings, we are dealing here with low-level internals, and this section is not about telling a story. They are technical options only. Booleans are implemented with the usual `false = 0` and `true = 1` convention. Note that other config files in Liquid War 6 might rely on floats, strings, and booleans with conventionnal `true` and `false` values, but not this one. `rules.xml` is special.

This `rules.xml` file is a direct image of the internal "rules" structure, so it contains technical, sometimes not very user-friendly parameters. While hacking `rules.xml` directly is a good way to test things, most of the time, the other file `hints.xml` contains more high-level informations that do the job the right way. A typicall example is speed.

See Section 4.11 [Map rules.xml], page 88.

### 3.1.13 hints.xml

This parameter is only used by the map loader. The map itself contains none of these parameters, they are only clues (hints, in fact..) on "how to load the map" which are passed to the loader.

Let's take an example : speed. This `rules.xml` file has a (rather) easy to use "speed" parameter, which will do all the job of finding the right resolution for your map, the right "rounds-per-sec" and "moves-per-round" parameters, in short, it will set many other parameters to fit your needs.

As far as the map designer is concerned, `rules.xml` and `hints.xml` could have been merged (but so would have `style.xml`) but internally they are very different: `rules.xml` contains the real parameters, the one used by the algorithm whereas `hints.xml` contains only instructions which are used once when loading the map and then disappear. The core algorithm has no idea of what was in `hints.xml`, once it's loaded.

See Section 4.12 [Map hints.xml], page 122.

### 3.1.14 style.xml

This is a simple XML file defining various appearance parameters. It has absolutely no effect on gameplay. These settings can ultimately be overriden by the player, but the idea is that if the map designer thinks this level looks better with this or that option, let him say it in this file.

See Section 4.13 [Map style.xml], page 128.

### 3.1.15 teams.xml

In this file one can specify per-map team settings. In short, this is where you can say how many bots you want, which color, and so on. This can be on a per-map basis, so that each map has different customized settings, some maps might be fun with only one bot, some other maps might be fun packed with 8 opponents.

Technically, `teams.xml` will allow you to define up to 4 players and 9 bots. This is an awfull lot considering there are only 10 colors. Basically, it's OK to simply define:

- 2 players (`player1` and `player2`)
- 4 bots (`bot1` and `bot2`)

It might also be a clever idea to just set up `player2` and `bot1` being the same color, in case of a conflict the game will pick up another color, but in practice those two entries often correspond to "the second player, bot or human, coming on the battlefield".

All in all, this represents 5 entries to set up (main player, other player or first bot which can be the same, then 3 more bots), it's OK to have the rest undefined or set to defaults.

Note that this can also simply be unset, and in that case the game defaults will apply, and the user will be able to change them, whereas if you set these up, the player will somewhat force to used the map settings.

See Section 4.14 [Map teams.xml], page 141.

### 3.1.16 Resampling

This is a very important point. Liquid War almost *always* resamples maps, unless you ask it not to do it. This is not recommended, it is believed in the general case, letting the internal algorithm make its own decisions is better than trying to figure out oneself "which is the best resolution".

The reason is, the right resolution (we're talking here of the logical resolution, how many fighters wide is the battlefield) often depends on the speed and general ressources the of the computer the program is running on. The map designer does not have this information. The program does. It runs a bench at startup. So this way it can choose, at runtime, the resolution which fits best.

The recommended way of doing things is not to try to be too picky about `rules.xml` parameters related to speed and also let the default map size limits in `hints.xml` to their defaults. Do not use them unless debugging stuff. Then the program will resample the map so that the player can play on it at a reasonnable speed. If map is too big, and it's often the case, then it will downsize it until there are sufficiently few fighters so that the CPU can handle the job. This, of course, is not rocket science. The bench calculation is a somewhat brute-force approach of doing things. Formally, we would have to run the map for good to figure out what is the right speed. Still, this bench gives good approximations.

Previous versions of the game relied heavily on 'fighter-scale' to resample maps, but this is not the case anymore. The 'fighter-scale' is now a minor parameter which is used to upsize maps if they are too small. In 99.9% of the cases, the map is first upsized by 'fighter-scale' for this parameter is by default set low (1.0) then downsized by 'bench-value' for real-life personnal computers can't handle 1600x1200 maps in real-time. Not yet.

There are a bazillion options to control map size, including 'min-map-surface'. They are here because it's important that, ultimately, people can do whatever they want with the game. But for map design, this is another story. Don't use them. Rely on 'bench-value' and just care about game speed. This is achieved by changing the "speed" parameter.

### 3.1.17 Music

It is possible to store your own custom music file within the map directory. You can call it whatever you want (you can keep its original name, which is something music authors

usually appreciate, even if there's no strong "attribution" clause on the license, it can be considered fair use not to fiddle to much with the name) you just have to place it in the same directory than the other files like `map.png` or `texture.jpeg`.

The following formats are known to work with the default SDL_mixer based `mod_ogg` backend:

- `ogg` (Ogg Vorbis files)
- `wav`
- `midi` (extensions `.mid` and `.midi` should both work)
- `mod`, `s3m` and `xm` files, AKA "modules".

To be more precise, here's how things work:

- step 1: the game tries to find the file `music-file` (parameter taken from `style.xml` or defined/overriden by player) in the current map directory; step 2: if not found, it will try every path in `music-path` to find this file. This includes the "system" music directory with musics that ship with the game, but also the `./music` subfolder in the user directory; step 3: if still not found, it will try to play a random file, relying on `music-filter` to ignore some files.

### 3.1.18 Experience ("exp")

In `rules.xml` you can set a special parameter which is `exp` and allows you to tell "a player can't load this map if he doesn't have at least `N` at his/her `exp` rating". Gaining `exp` (stands for "experience") isn't hard, you just need to win a level with `exp=N` to gain `exp=N+1`.

By default, the player's `exp` is 0 and levels default to 1, so this means only levels with `exp` set explicitely to 0 in `rules.xml` might be used. Then player wins that level and is given access to all maps by default, unless these are explicitely set with `exp` greater than 1.

In solo game, when a player wins a level, he's automatically redirected to the map which is in the same directory and has exactly the `exp` he just gain. For instance, if you win a map with `exp=5` then you're chained to the first map (in alphabetical order) which has `exp=6`. By setting up the `exp` parameter the right way, with a map for each `exp` level one can transform a simple map directory in a scenario that player will automatically follow.

Last, but not least, the game, at startup, only allows you to play red, green, blue and yellow. Other colors are unlocked as you progress among levels. Same things with weapons, there are "liberated" continuously through the game.

This mechanics allows the following behavior:

- when game is launched first, only a small subset of maps are accessible
- after you win one map (sort of quite easy) you gain access to the next level, plus many of the maps of the `extra` package.
- after each map you win, you're redirected to the next map, and regularly, you gain access to new colors/weapons

As a final word, yes, it's possible to cheat, fool the exp system, but it's believed this is moot and lame.

## 3.2 Translating

### 3.2.1 Using gettext

Liquid War 6 uses GNU gettext for all its messages. There's an online manual about this tool. In practice, what you have to do as a translator is to edit the `po/xx.po` file with `xx` being your language / country code. For instance, to translate the game in French, one needs to edit `po/fr.po`.

### 3.2.2 Formatted strings

This is very important, you might already be aware of it if you are familiar with gettext, but still it's worth mentionning : when a string contains special characters such as `%d` or `%s` (in a general manner, anything with a `%` it's important that all translations contain exactly the same number of `%d`s and `%s`s than the original.

For instance:

```
"foo has %d bars (%s)"
```

can be translated to:

```
"ziblug zdonc %d zuc - %s - tac"
```

The number, order and type of `%` entries is preserved. To learn more about these formats, use `info printf` or `man 3 printf`. In a general manner, get informations about printf.

Additionnally, some strings are used by Scheme (Guile) code and not by C code. Thus, they don't use the standard C/printf convention. In these strings, what you must preserve and be aware of is the tilde character `~`. Very often you'll see `~a` in a string. As with the printf `%`, you must preserve the number, order and type of those. There is a complete online reference about this way of formatting strings.

### 3.2.3 Partial translation

Liquid War 6 has thousands and thousands of messages which could theorically be translated. In practise it's counter-productive to spend time to translate those, as the game is still evolving constantly, and as most of these messages are technical messages which inform about rare bugs and strange conditions. All sort of informations which, while valuable, are not intented for end-users and are more destinated to be reported in bug reports. To select only the interesting messages to translate, the current gettext configuration only uses a reduced set of files.

- `src/scriptpo.c` : the most important file. It contains the definitions used by all the Guile code, this is where you'll find all the menu labels.
- `src/lib/sys/sys-log.c` : log messages and keywords. These are not the log messages themselves, it only concerns the log engine. One can for instance replace `WARNING` by `ATTENTION`.
- `src/lib/hlp/hlp-credits.c` : the credits, which are displayed at game startup in the splash screen.
- `src/lib/lw6-print.c` : contains some messages printed on the console.

As a side note, the file `src/lib/hlp/hlp-reference.c` contains all the entries for the various configuration options, anything that can be queried by `liquidwar6`

`--about=<keyword>`. This is several hundred messages. It might be interesting to translate them some day, but it's obviously not a priority today.

## 3.3 Architecture

### 3.3.1 C + Guile

Technically, Liquid War 6 is a collection of C functions which are exported to Guile. The main binary embeds a Guile interpreter, which will run a Guile script. This script calls the exported C functions, and glues them together.

It should be possible to implement the game without using Guile at all, using C code to make the various modules communicate together. This might seem an easier way to go, not involving several languages. However, using this script level is a good way to achieve several important goals:

- it's possible, at any time, to query the game about its internal state, dump objects, take actions. That's what the console is about. It's a bit like having an embedded debugger, it's really a very convenient tool to develop, make experiments and track problems.
- many hacks can be done without recompiling anything at all. Simply edit a few files with an editor, and your patch is running. Once the binary base is set up, hacking scripts on top of it is (almost) a piece of cake.
- forcing the program to use scripts to transfer informations from a module to another is a good way to avoid "spaghetti" code, when modules cross-use each other in an uncontrollable way. Of course in some cases, modules communicate directly, especially when performance is important. But for many tasks, it's just very comfortable and safe to have module A send orders to module B through a high-level script API.

Having Guile to implement high-level stuff also decreases, to some extent, the need for object-oriented features of C++. The big picture is : low level code that require speed, optimized data processing, is written in C. Code which is more high level and requires abstraction is written in scheme.

### 3.3.2 Threading and SMP

Liquid War 6 makes a heavy usage of threads. Early versions of the game did not have this feature but starting with 0.0.7beta, one can really consider the game is heavily threaded.

There's basically:

- a thread to handle the main control flow. This thread runs scheme code which Guile. It's not the most CPU-greedy thread, but when it's stalled, there's no more interaction between the user and the program.
- a thread to handle the display. Depending on rendering options, this thread can consume lots of CPU cycle. On a single processor/core system, it can be interesting to lower rendering options in order to gain speed on other aspects of the game. On a quad-core system, it's probably useless, just play with all bells and whistles activated.
- two threads to run the core algorithm. One maintains the so-called reference state, the other being dedicated to the draft sate. In a local game there's no draft state so only one of those two threads is used. There's even a technical optimization which can be

turned on and can theorically use even more threads and be efficient on very big maps but well, it's rather untested and still has to prove its real efficiency.

- a thread to handle map loading. This one is not active all the time, it's just here to keep a preemptive interface while loading complex maps.
- network code can also fire threads, especially when connecting on remote systems.

So globally, if you have an SMP system, the game will be happy with it. It will also run on a single processor, as the program uses POSIX pthreads it's capable to run on any computer which has pthreads implemented for it.

But, and this is a strong limitation, without pthreads, the game won't run. At all. Or at least, not unless it's almost completely rewritten.

### 3.3.3 Internal libraries

The C code is splitted into several internal libraries. This allow independant testing of various game modules.

The main module, the most important one, is `libker`, (stands for "kernel"). This is were the core algorithm is. To some extent, the rest of the code is just about how to provide this module with the right data and environment. Logically, if you profle the game, you should find out that a great part of the CPU time is spent here. Code here is about spreading gradients, moving fighters and cursors.

The `libmap` module is here to handle maps, it contains the code to manipulate maps in memory. But it does not know how to load them from disk. This is the responsability of another module, `libldr`, which is linked against libraries such as libpng or libjpeg and does the job of transforming those standard formats into a usable in-memory structure. There's still a third moduled involved in map handling, it's `libtsk`, whose job is to load a level in the background. It has a 2-steps asynchronous loading system which allows the game to load maps while the user interface is still responsive, and give a preview of the map as soon as possible, when loading continues in the background, building optimizing structures which are usefull when playing but not mandatory just to show the map.

At the other end of the algorithm-chain, the `libpil` module will "pilot" things. It's this module which will translate text readable orders (typically adapted for network usage) into function calls. It has event lists, keeps them in the right order, and will also permanently maintain three different states of the game. A backup state which can be used any time to go back in time and get the game in a stable 100% sure state. A reference state which is correct but ever changing. Basically backup plus all the orders received between backup and reference gives reference. And finally a draft state which is as up to date as possible but might be wrong. This is typically interesting in network game, where we want to show something moving, something fast, even if there's lag on the network and other computers fail to send information in time. In this case we display draft while still keeping reference and updating it when we finally receive valid informations. Backup would be used to send bootstrap information when people are joining a new game, or to check up if things are going right.

A special `libbot` module is here to handle bot algorithms. A bot is just a simple `move` function which takes a game state as an input, and returns an `x,y` position, just the way a mouse handler would. How complex a bot is "under the hood" depends on the type of bot. Current bots are really basic. Additionnally, `libsim` will run dummy fight simulations to

find out wether some team has a real advantage on another one, speaking of team profiles depending on colors.

The `libgfx` module handles all the graphics stuff. It is itself splitted in several sub-modules, that is, it does not do anything but load a module such as `mod-gl` which will actually contain the implementation. In an object-oriented language, it would be an abstract class, an inteface. The implementation does not need to be thread-safe. It's better if it is, for theorically it could be possible to fire Liquid War 6 with two display backends running at the same time on the same game instance, but this code has yet to be written, and it's a rare dual headed configuration which probably has no real-life usage. If only one graphics backend is activated at a time, the rest of the implementation garantees there will never be two concurrent calls to a function is this module. It is the `libdsp` ("display") which handles this. It fires a thread for rendering purposes, and sends information to this thread, detecting automatically if it's necessary to acquire a mutex and update rendering informations. For the caller, this is transparent, one just has to call an update function from time to time. The module will even perform "dirty-reads" on a game state being calculated, to render things in real time, as soon as possible.

An experimental `libvox` module is under design/development and might, in the future, provide a real-time voxel renderer. Still pre-alpha stage.

To ease up the implementation of different graphics backends, a `libgui` module contains code which is meant to be used by any graphics backend. It's just a factorisation module, containing common code and interfaces, related to displaying things. This is where, for instance, one can find a high level menu object.

The `libsnd` module handles sound. It's also an abstract class, an interface, which uses dynamic backends as implementations.

The `libnet` module is a wrapper over different network APIs, it handles Winsock and POSIX sockets in a uniform manner. The `libcli` and `libsrv` contain network client and server code, implementing the various protocols in dynamically loadable sub-modules. It's the role of `libp2p` to glue this together, handle the list of available servers, the message queue, verifying nobody is cheating, and so on. All this modules share information about current game state using code & structures defined in `libnod`,use message utilities (format, parse) defined in `libmsg` and share code concerning connections in `libcnx`. Additionnally, `libdat` provides facilities to store old network messages and sort them.

The `libsys` module contains most system and convenience functions, it handles logs, type conversions, timer, memory allocation, it's the fundamental module every other module depends on. It has a compation `libglb` module with all the Gnulib shared code.

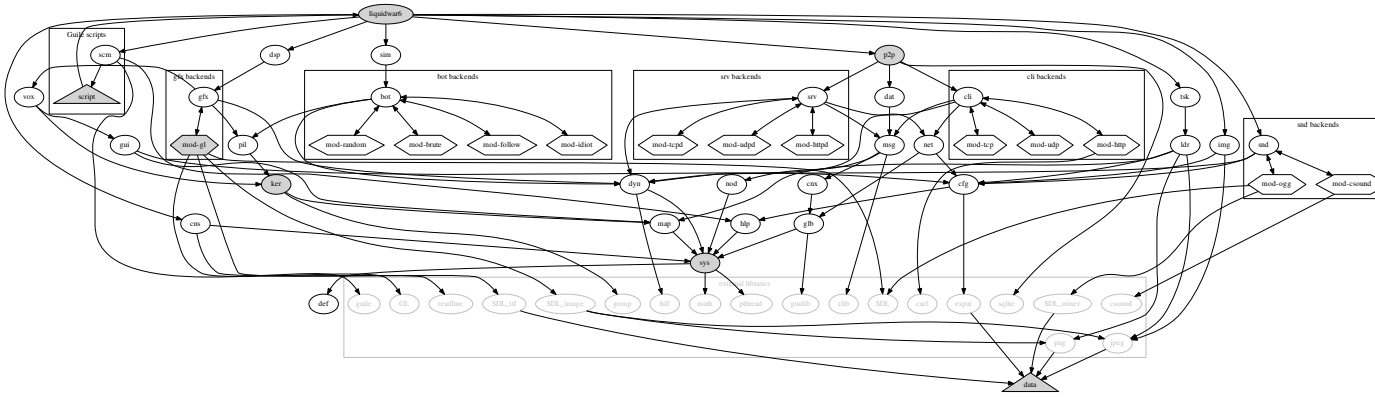
The `libhlp` is used to handle keywords and internal self-documentation (this is what is used by `--list` and `--about`), `libcfg` knows how to read and save config files, `libcns` handles the console, and `libdyn` can load `.so` shared files dynamically.

To glue all this, there are some Guile bindings with helper functions available in `libscm` which fills two needs, one being an easy way to check if Guile linking is working correctly without requiring all other modules to be available, and also performing automatic checks on some actions such as registering or executing a function.

Finally there are small modules like `libimg` (to make screenshots of the game) which have been separated because they required special libraries to link with and/or did not really fit in existing modules for dependencies reasons.

So well, this is a lot of modules. The list might move a bit, but the big picture is here. Each module is testable separately.

Below is a Graphviz diagram, which shows the modules dependencies.




## 3.4 Memory structures

The most important memory structures in Liquid War 6 are:

- map (`lw6map_level_t`) : this contain the map immutable informations. This is what resides in memory after a map has been loaded from the disk. It contains all the various `.png` and `.jpeg` files stored as pixel arrays, resampled if need, and also contains the various map attributes. Once this structure is ready, the game is capable of displaying the map on the screen, but it can not do anything with it yet.
- game_struct (`lw6ker_game_struct_t`) : this one contains the same informations as the previous structure, only the information has been post-treated so that it's ready for use by the core algorithm. It will, for instance, contain the famous mesh structure, which groups squares by packets of 1, 4, 16, 64 or more. The reason it's been separated from the level is that operations such as creating the mesh might require a lot of time. So to allow players to see the level while black magic is still running in the background, it was required to make a difference between what is required to view the map ("level") and what is required to play on it ("game_struct").
- game_state (`lw6ker_game_state_t`) : contains all the variable, ever changing game data. This is where the position of fighters is stored, their health, and such things. It is designed to be synchronizable by using mostly simple calls to `memcpy`. It heavily relies on the previous structures, the idea is that one can have several "game_state" plugged on a single "game_struct".

All these structures are defined in the `ker/ker.h` header.

## 3.5 100% predictable algorithm

The core Liquid War 6 algorithm is 100% predictable, that is to say, given the same input, it will produce the same results, on any computer. Previous versions of the game also had this property. This is very important for network games, since in a network only informations such as "cursor A is at position x,y" are transmitted. Every node maintains its own internal

game state, so it's very important that every node comes with the same output given the same input.

For this reason Liquid War 6 never uses floating point numbers for its core algorithm, it uses fixed point numbers instead. It also never relies on a real "random" function but fakes random behavior by using predictable pseudo-random sources, implementation independant, such as checksums, or modulos.

There are also some optimizations which are not possible because of the predictability requirement, for instance one can not spread a gradient and move the fighters in concurrent threads, or move fighters from different teams in different threads.

If you read the code, you'll find lots of checksums here and there, a global checksum not being enough for you never know where the problem happened. The test suite uses those facilities to garantee that the game will run the same on any platform.

Not being able to rely on a predictable algorithm would require to send whole game states on the network, and this is certainly way too much data to transmit. A moderate 200x200 map has a memory footprint of possibly several megabytes, so serializing this and sending it to multiple computers at a fast-paced rate is very hard, if possible at all, even with a high bandwidth. We're talking about Internet play here.

## 3.6 About mod-gl

### 3.6.1 The main renderer

Liquid War 6 has a modular architecture which allows the programmer (and the player) to plug pretty much any rendering/graphics backend, provided this one is... developped.

As of 2009 the only available backend is still `mod-gl`, it will display the game using 3D acceleration, if available, through the SDL library, using its GL bindings.

Additionnally, versions available for Microsoft Windows and Mac OS X will probably never any other backends available. For technical reasons, those platforms do not have the flexibility of GNU/Linux and do not allow graphical libraries to be loaded dynamically. In practice, both of them require hacks that override the standard `main` function. Microsoft Windows has its `WinMain` instead, and Mac OS X is even more pedantic, requiring graphical functions to be executed in the main thread. So `mod-gl` is just linked statically in those versions, and the modularity of the game is purely theorical on these platforms.

This `mod-gl` module is really one of the key stones of Liquid War 6, and if you want to change graphical things, it's definitely the place to hack on. The source is in `src/lib/gfx/mod-gl`.

### 3.6.2 Hardware requirements

The `mod-gl` backend requires "moderate" hardware, but it still does require hardware acceleration. Pure software rendering through mesa for instance, won't be enough.

So if you're running Xorg on GNU/Linux and there's a DRI driver for your card, the game should run fine.

On the programmer side, the counterpart is that one should not rely on fancy OpenGL features. Textures have a maximum size of 512x512 for instance. Of course some maps are bigger than this but this means that internally, `mod-gl` splits them into smaller tiles, and displays those tiles one by one.

### 3.6.3 The gl-utils toolbox

Inside the `mod-gl` backend, the `src/lib/gfx/mod-gl/gl-utils` directory contains lots of common structures, factorized functions which can (and should, if appliable) be used.

## 3.7 Compilation tips

### 3.7.1 Advanced ./configure options

In addition to all the common Autoconf switches such as `--prefix`, Liquid War 6 has some custom switches:

- `--enable-console`: allows you to turn on/off console support. Normally this is detected automatically but in case you really want to disable it on platforms which support it, you can. This will cause the program no to link against `libreadline`, among other things.
- `--enable-gtk`: allows you to turn on/off gtk support. Normally this is detected automatically but in case you really want to disable it on platforms which support it, you can. This will cause the program no to link against GTK libs.
- `--enable-optimize`: will turn on optimizations. This will turn on compiler options such as `-fomit-frame-pointer` but also disable some code in the program. Indeed, most of the advanced memory checking in the game - which ensures it does not leak - will be turned of. This will certainly speed up things, however, it's not recommended to turn this on until program is not stable enough so that memory leaks and other problems can be declared 'impossible'. Turn this on if you really have some speed problem, otherwise it's safer to use the full-featured 'slow' version of the game.
- `--enable-paranoid`: will turn on very picky and pedantic checks in the code, try this when you suspect a serious memory bug, a race condition whatsoever, and want to track it down. Useless for players.
- `--enable-headless`: will allow compilation without any graphics backend. The game is unplayable in that state but one can still wish to compile what is compilable, for testing purposes.
- `--enable-silent`: will allow compilation without any sound backend. The game won't play any music in that state but one can still wish to compile what is compilable, for testing purposes.
- `--enable-allinone`: will stuff all the internal libraries into one big executable. Very convenient for profiling. The major drawback is that you need to have all the optional libraries installed to compile all the optional modules. Another side effect is that with this option there's no more dynamic loading of binary modules, so if your platform has a strange or buggy support for `.so` files, this option can help.
- `--enable-fullstatic`: will build a totally static binary, that is using the `--static` option for `gcc` and the `-all-static` option for `libtool`. Currently broken, this option could in the future allow for building binaries that run pretty much everywhere, without requiring any dependency but a Kernel.
- `--enable-gprof`: will enable profiling informations. This will activate `--enable-allinone`, else you would only track the time spent in functions in the main `liquidwar6` executable, and exclude lots of interesting code contained in dynamic libraries.

- `--enable-instrument`: will instrument functions for profiling. This will turn on the `-finstrument-functions` switch when compiling, so that the hooks `__cyg_profile_func_enter` and `__cyg_profile_func_exit` are called automatically. Then you can link against tools like cprof or FunctionCheck.
- `--enable-profiler`: will enable Google Performance Tools support. Basically, this means linking against `libtcmalloc` and `libprofiler`. You could activate those by using `LD_PRELOAD` or by using your own `LDFLAGS` but using this option will also make the game tell you if `CPUPROFILE` or `HEAPPROFILE` are set when it starts. The `pprof -gv` output is very handy. Note that on some systems `pprof` is renamed `google-pprof`.
- `--enable-gcov`: will enable coverage informations, to use with gcov and lcov. This is for developpers only. It will activate `--enable-allinone`, else there would be some link errors when opening dynamic libraries. The obtained information is available online: coverage. and GNU global.
- `--enable-valgrind`: will enable some `CFLAGS` options which are suitable for the use of Valgrind, to track down memory leaks and other common programming errors. Use for debugging only, usually together with `--enable-allinone`.

### 3.7.2 Debian packages

Liquid War 6 does have a `./debian` in both main and extra maps packages, so it's "debianized". To build the main `.deb` package, untar the main source tarball, then:

```
make dist
cd pkg
cp ../liquidwar6-X.Y.Z.tar.gz . # X.Y.Z is the version
make deb
```

Note that you have to copy the source tarball to `./pkg` and move to this directory before typing `make deb`. This is, among other things, to simplify the main `Makefile`.

To build the extra maps `.deb` package, untar the extra maps tarball, then:

```
make deb
```

### 3.7.3 Red Hat packages

Liquid War 6 does have a `.spec` files in both main and extra maps packages. To build the main `.rpm` package, untar the main source tarball, then:

```
make dist
cd pkg
cp ../liquidwar6-X.Y.Z.tar.gz . # X.Y.Z is the version
make rpm
```

Note that you have to copy the source tarball to `./pkg` and move to this directory before typing `make rpm`. This is, among other things, to simplify the main `Makefile`.

To build the extra maps `.rpm` package, untar the extra maps tarball, then:

```
make rpm
```

### 3.7.4 Microsoft Windows msys/mingw32 port

This section describes how to compile the game from source under Microsoft Windows. Note that players are encouraged to use a free system such as GNU/Linux, which is the

platform Liquid War 6 is being hacked on by default. If you encounter problems with this port, you'll probably save time by installing a double-boot with GNU/Linux coexisting with your previous Microsoft Windows install.

Basically, Liquid War 6 requires MinGW. More precisely, it requires MSYS. A standard Cygwin installation won't work, because it is too UNIXish to allow third party libraries like SDL to compile natively. You might argue that SDL is available for Cygwin, but in reality, the Cygwin port of SDL is a MinGW port. Indeed, Cygwin brings all standard POSIX functions including the use of `main` instead of `WinMain` and I suspect this is a problem for graphical libraries like SDL which do require some sort of direct access to the OS low-level functions. Therefore, MinGW is more adapted for it does not define all these functions, and allows any library to hook on Microsoft Windows internals directly. Point is then, you also loose the cool effect of Cygwin which is to have a complete glibc available, including network functions like `select` defined the POSIX way, and not the WinSock way. If you ever ported code from POSIX sockets to WinSock 2, you know what I mean. Using MinGW is also embarassing for some libraries won't compile easily, and for instance programs which heavily rely on a real `TTY` interface to work are usually hard to port. This includes ncurses and GNU readline. Liquid War 6 tries to have workarrounds for all this, and in some cases the workarround is simply that embarassing code is not compiled on Microsoft Windows. For this reason, some features are not available on this platform. Period.

Now the reason you need MSYS and not only MinGW is that MSYS will allow `./configure` scripts to run, and this eases up the porting process a lot. MinGW and MSYS packages are downloadable on the SourceForge MinGW download page. Alternatively, there is a mirror on ufoot.org, but files might be outdated.

To compile Liquid War 6, first download and unzip all the following files in the same directory, for instance `C:\MSYS`. If you do not have any tool to handle `.tar.gz` and `.tar.bz2` files under Microsoft Windows, which is likely to be the case when MSYS is not installed yet, you can untar these on any GNU/Linux box, then upload the whole directory to the target Windows host.

- autoconf2.5-2.61-1-bin.tar.bz2
- autoconf-4-1-bin.tar.bz2
- autogen-5.9.2-MSYS-1.0.11-1-bin.tar.gz
- autogen-5.9.2-MSYS-1.0.11-1-dev.tar.gz
- autogen-5.9.2-MSYS-1.0.11-1-dll25.tar.gz
- automake1.10-1.10-1-bin.tar.bz2
- automake-3-1-bin.tar.bz2
- bash-3.1-MSYS-1.0.11-1.tar.bz2
- binutils-2.18.50-20080109-2.tar.gz
- bison-2.3-MSYS-1.0.11-1.tar.bz2
- coreutils-5.97-MSYS-1.0.11-snapshot.tar.bz2
- crypt-1.1-1-MSYS-1.0.11-1.tar.bz2
- csmake-3.81-MSYS-1.0.11-2.tar.bz2
- cvs-1.11.22-MSYS-1.0.11-1-bin.tar.gz
- diffutils-2.8.7-MSYS-1.0.11-1.tar.bz2

- findutils-4.3-MSYS-1.0.11-1.tar.bz2
- flex-2.5.33-MSYS-1.0.11-1.tar.bz2
- gawk-3.1.5-MSYS-1.0.11-1.tar.bz2
- gcc-core-3.4.5-20060117-3.tar.gz
- gcc-g++-3.4.5-20060117-3.tar.gz
- gcc-g77-3.4.5-20060117-3.tar.gz
- gcc-objc-3.4.5-20060117-3.tar.gz
- gdb-6.8-mingw-3.tar.bz2
- gdbm-1.8.3-MSYS-1.0.11-1.tar.bz2
- gettext-0.16.1-1-bin.tar.bz2
- gettext-0.16.1-1-dll.tar.bz2
- gettext-0.16.1-MSYS-1.0.11-1.tar.bz2
- gettext-devel-0.16.1-MSYS-1.0.11-1.tar.bz2
- inetutils-1.3.2-40-MSYS-1.0.11-2-bin.tar.gz
- libiconv-1.11-1-bin.tar.bz2
- libiconv-1.11-1-dll.tar.bz2
- libiconv-1.11-MSYS-1.0.11-1.tar.bz2
- libtool1.5-1.5.25a-1-bin.tar.bz2
- libtool1.5-1.5.25a-1-dll.tar.bz2
- libtool1.5-1.5.25a-20070701-MSYS-1.0.11-1.tar.bz2
- lndir-6.8.1.0-MSYS-1.0.11-1.tar.bz2
- lpr-1.0.1-MSYS.tar.gz
- lzma-4.43-MSYS-1.0.11-1-bin.tar.gz
- make-3.81-MSYS-1.0.11-2.tar.bz2
- mingw-runtime-3.14.tar.gz
- mingw-utils-0.3.tar.gz
- minires-1.01-1-MSYS-1.0.11-1.tar.bz2
- MSYS-1.0.11-20071204.tar.bz2
- msysCORE-1.0.11-2007.01.19-1.tar.bz2
- openssh-4.7p1-MSYS-1.0.11-1-bin.tar.gz
- openssl-0.9.8g-1-MSYS-1.0.11-2-bin.tar.gz
- openssl-0.9.8g-1-MSYS-1.0.11-2-dev.tar.gz
- openssl-0.9.8g-1-MSYS-1.0.11-2-dll098.tar.gz
- perl-5.6.1-MSYS-1.0.11-1.tar.bz2
- perl-man-5.6.1-MSYS-1.0.11-1.tar.bz2
- regex-0.12-MSYS-1.0.11-1.tar.bz2
- tar-1.19.90-MSYS-1.0.11-1-bin.tar.gz
- texinfo-4.11-MSYS-1.0.11-1.tar.bz2
- vim-7.1-MSYS-1.0.11-1-bin.tar.gz

- w32api-3.11.tar.gz
- zlib-1.2.3-MSYS-1.0.11-1.tar.bz2

This file list might contain file which are not absolutely mandatory for Liquid War 6, for instance the Fortran 77 compiler is absolutely useless, but installing it won't harm either. Some packages might unzip things the right way, but some do it in a subfolder. You might need to run commands like:

```
cp -r coreutils*/* .
rm -rf coreutils*
```

Get rid of useless files:

```
rm ._.DS_Store .DS_Store
```

It's also mandatory to move everything that has been installed in `/usr` or `/usr/local` to `/` since MSYS has some builtin wizardry which maps `/usr` on `/`. You need to do this if you don't unzip files from a MinGW shell, which is obviously the case when you first install it. Usefull command can be:

```
mv usr/* .
rmdir usr
```

Next, `libintl` is not correctly handled/detected by LW6, and can raise an error like `"gcc.exe: C:/msys/local/lib/.libs/libintl.dll.a: No such file or directory"` so one needs to copy some libraries in `/usr/local/lib/.libs/`:

```
mkdir local/lib/.libs
cp local/lib/libintl.* local/lib/.libs/
```

Another step is to edit `/etc/profile` and add lines like:

```
export CFLAGS="-g -I/usr/local/include"
export LDFLAGS="-L/usr/local/lib"
export GUILE_LOAD_PATH="C:\\MSYS\\local\\share\\guile\\1.8\\"
```

Close and re-launch your msys shell (rxvt) so that these changes take effect. Check that those values are correctly set:

```
env | grep FLAGS
env | grep GUILE
```

Finally, your MSYS environment is (hopefully...) working.

Now you need to compile the following programs, from source. Files are mirrored on ufoot.org for your convenience, however these might be outdated. Still, there are known to work. Proceed like if you were under a POSIX system. Some packages use the `--disable-rpath` swith, there are various reasons for which rpath is an issue. In the same manner, `--disable-nls` when linking against `libintl` or `libiconv` was painful.

- pthreads-win32, untar pthreads-w32-2-8-0-release.tar.gz then `make clean GC; cp pthread.h sched.h /usr/local/include/; cp pthreadGC2.dll /usr/local/bin/; cp libpthreadGC2.a /usr/local/lib/`
- GNU MP, untar `gmp-4.2.2.tar.gz` then `./configure && make && make install`
- Guile, untar `guile-1.8.5.tar.gz`. Edit `libguile/guile.c` and insert `#undef SCM_IMPORT` just before `#include <libguile.h>`. Edit `./libguile/threads.c` and place `struct timespec { long tv_sec; long tv_nsec; };` just before `#include "libguile/_scm.h"`. Then `./configure --disable-nls --disable-rpath`

`--disable-error-on-warning --without-threads && make && make install`. The `GUILE_LOAD_PATH` value must be correctly set for `guile-config` to work. For unknown reasons, running `guile` can throw a stack overflow error. Don't panic. See bug 2007506 on SourceForge.net for an explanation on why the Guile binary shipped with MSYS is not suitable for Liquid War 6.

- expat, untar `expat-2.0.1.tar.gz` then `./configure && make && make install`
- SQLite, untar `sqlite-amalgamation-3.5.9.tar.gz` then `./configure && make && make install`
- libpng, untar `libpng-1.2.29.tar.gz` then `./configure && make && make install`
- libjpeg, untar `jpegsrc.v6b.tar.gz` then `./configure && make && make install && make install-lib`
- libcURL, untar `curl-7.18.1.tar.gz` then `./configure --without-ssl && make && make install`
- FreeType 2, untar `freetype-2.3.5.tar.gz` then `./configure && make && make install`
- libogg, untar `libogg-1.1.3.tar.gz` then `./configure && make && make install`
- libvorbis, untar `libvorbis-1.2.0.tar.gz` then `LDFLAGS="$LDFLAGS -logg" && ./configure && make && make install`
- SDL, untar `SDL-1.2.13.tar.gz` then `./configure && make && make install`
- SDL_image, untar `SDL_image-1.2.6.tar.gz` then `./configure && make && make install`
- SDL_mixer, untar `SDL_mixer-1.2.8.tar.gz` then `./configure && make && make install`
- SDL_ttf, untar `SDL_ttf-2.0.9.tar.gz` then `./configure && make && make install`

For your convenience, a zip file containing a complete MSYS "Liquid War 6 ready" environment is available. It is simply the result of all the operations described above. Simply unzip msys-for-liquidwar6-20080819.zip (about 240 megs) in `C:\MSYS\`. All dependencies compiled in `/local` have been generated using the command:

```
cd /usr/local/src
./msys-for-liquidwar6-build.sh > ./msys-for-liquidwar6-build.log 2>&1
```

Note that this script does't do everything, you'll still need to edit Guile source code and patch it manually.

It might even be possible to use this MSYS environment under Wine. Simply unzip it under `$HOME/.wine/drive_c`, and run `wine "$HOME/.wine/drive_c/windows/system32/cmd.exe" /c "c:\\msys\\msys.bat"` and with luck, you'll get a working shell. Note that this might allow you to compile the game, but running it is another story. Consider this MSYS over Wine trick as a hack enabling the use of free software only when compiling for Microsoft proprietary platform. It is not a reasonnable way to run the game. If running under a UNIXish platform, or better, GNU, simply run native code. Use the Windows 32-bit port only if you are jailed on a Microsoft system.

Now, let's come to the real meat, untar the Liquid War 6 source tarball, launch your MSYS shell, and:

```
./configure
make
make install
```

Now the binary is in `src/.libs/liquidwar6.exe` (beware, `src/liquidwar6.exe` is only a wrapper). This binary is an MSYS/MinGW binary, so it read paths " la" Microsoft, that is, it has no knowledge of what `/usr` is, for instance. It requires paths starting by `C:\`.

### 3.7.5 Mac OS X port

This is still experimental. Basically, install MacPorts, and most dependencies with, except for SDL which you compile from source. The idea is to compile SDL using the native OS X bindings (and not some other GL files you could have in `/opt/local` installed by MacPorts), then compile the game and other SDL dependencies against this SDL.

The SDL_mixer library might need to be told to compile itself without dynamic ogg support. By default it seems that it tries to load `libvorbisfile.dylib` at runtime, and it can fail. To disable this dynamic loading, use for instance :

```
/configure --prefix=/opt/extra --enable-music-ogg --disable-music-ogg-shared
```

Also, it might seem obvious for Mac OS X users, but there are some important issues related to compiling options and handling dynamic libraries at runtime.

- The command `ldd` does not exist, run `otool -L` instead.
- The equivalent of `LD_LIBRARY_PATH` is `DYLD_LIBRARY_PATH`.
- The extension for shared binaries is `.dylib` and not `.so`.
- You might need to set the `OBJCFLAGS` environment variable along with `CFLAGS` because the Mac OS X port uses some Objective-C code.

It is very important to have the right SDL flags when linking the Liquid War 6 binaries. For instance it could be:

```
-I/opt/extra/include -I/opt/local/include -Wl,-framework -Wl,CoreFoundation -I/opt/local/in
```

The point is to have Cocoa and OpenGL support. Depending on the way you installed SDL, you might also need to include an SDL framework support, this is mostly if you installed SDL from .dmg binary images, and not from source with the command line. A typical output of `sdl-config --libs` is:

```
-L/opt/extra/lib -lSDLmain -lSDL -Wl,-framework,Cocoa
```

Another important issue is to include `SDL.h`, which in turn includes `SDLmain.h`, in all the .c source files defining the standard `main` function. This is done in liquidwar6 but should you try to link yourself on liquidwar6 libraries and/or hack code, you must do this or you'll get errors when running the game. Such errors look like:

```
*** _NSAutoreleaseNoPool(): Object 0x420c90 of class NSCFNumber autoreleased with no pool i
```

The reason is that SDL replaces your `main` with its own version of it. One strong implication is that all the dynamic loading of SDL, which works on sandard GNU/Linux boxes, won't work under Mac OS X, since SDL hard codes itself by patching `main` with `#define` C-preprocessor commands.

A `.dmg` file (disk image) containing a `Liquid War 6.app` folder (OS X application) is available for your convenience. It might work or not. In doubt, compile from source. The complicated part about this package (a "bundle" is OS X language) is that it needs to

embed various libraries which are typically installed in `/opt` by MacPorts on a developper's machine. So to build this package a heavy use of the utilility `install_name_tool` is required, normally all libraries needed ship with the binary, remaining depedencies concern frameworks which should be present on any working Mac OS X install. Still, this is only theory. Needs to be widely tested.

The layout of the bundle follows:

- `./Contents/Info.plist`: metadata, bundle description file
- `./Contents/MacOS`: contains the main binary `liquidwar6` as well as all specific low-level libraries
- `./Contents/Resources/data`: general game data, does not contain maps.
- `./Contents/Resources/music`: music for the game.
- `./Contents/Resources/map`: system maps, you can put your own maps (or "extra" maps) here if you want all users to share them.
- `./Contents/Resources/script`: Liquid War 6 specific scripts, the scheme scripted part of the program.
- `./Contents/Resources/guile`: common shared Guile scripts, part of Guile distribution.
- `./Contents/Resources/doc`: documentation in HTML and PDF formats.

Additionnally, the Mac OS X port uses `/Users/<username>/Library/Application Support/Liquid War 6/` to store configuration file, logs, etc. It does not use `$HOME/.liquidwar6` like the default UNIX port.

The Mac OS X port also has a special behavior, in order to load some libraries with dlopen (SDL_image does this with libpng and libjpeg) it needs to set `DYLD_FALLBACK_LIBARY_PATH` to a value that contains these libraries. This is typically in the bundle distributed on the disk image. On a developper's computer this problem does not appear for those libs are often in places like:

- `/usr/local/lib`
- `/usr/X11/lib`
- `/opt/local/lib`

So the program sets `DYLD_FALLBACK_LIBARY_PATH` (but not `DYLD_LIBRARY_PATH` else it breaks internal OS X stuff which relies, for instance, on libjpeg library that has the same name but different contents) but it needs to do it before it is even run, else the various `dyld` functions do not acknowledge the change. That is, calling the C function `setenv()`, even before `dlopen()`, has no effect. So the program calls `exec()` to re-run itself with the right environment variable. This is why, on Mac OS X, there are two lines (exactly the same ones) displaying the program description when it is started in a terminal.

### 3.7.6 GP2X port

This is not working yet, but there are good hopes that some day, Liquid War 6 can run on a GP2X console. This handled gaming device uses a Linux kernel on an ARM processor, does support most GNU packages through cross-compilation, and has basic SDL support.

To compile Liquid War 6 for GP2X, you first need to set up a working "toolchain". It's suggested you do this on a working GNU/Linux box. There are several solutions, the recommended one being Open2x. Read the online documentation on how to install Open2x.

Basically, the following should work:

```
mkdir /opt/open2x # check that you can write here
svn co https://open2x.svn.sourceforge.net/svnroot/open2x/trunk/toolchain-new open2x-toolcha
./open2x-gp2x-apps.sh
cd open2x-toolchain
```

Then, for your environment to be complete, you need to set up some environment variables. For instance:

```
export OPEN2X_SYSTEM_PREFIX=/opt/open2x/gcc-4.1.1-glibc-2.3.6/arm-open2x-linux
export GP2X_USER_PREFIX=$HOME/gp2x

export CC=${OPEN2X_SYSTEM_PREFIX}/bin/arm-open2x-linux-gcc
export CPP=${OPEN2X_SYSTEM_PREFIX}/bin/arm-open2x-linux-cpp
export CXX=${OPEN2X_SYSTEM_PREFIX}/bin/arm-open2x-linux-g++
export AS=${OPEN2X_SYSTEM_PREFIX}/bin/arm-open2x-linux-as

export CFLAGS=''-I${OPEN2X_PREFIX}/include -I${GP2X_USER_PREFIX}/include''
export CPPFLAGS=''-I${OPEN2X_PREFIX}/include -I${GP2X_USER_PREFIX}/include''
export CXXFLAGS=''-I${OPEN2X_PREFIX}/include -I${GP2X_USER_PREFIX}/include''
export LDFLAGS=''-L${OPEN2X_PREFIX}/lib -L${GP2X_USER_PREFIX}/lib''

export PATH=''${GP2X_USER_PREFIX}/bin:${OPEN2X_SYSTEM_PREFIX}/bin:$PATH''
```

In this setting, there's a user `$HOME/gp2x` directory which will contain all the Liquid War 6 related libraries while the `/opt/open2x` remains untouched.

Then you need to install the requirements. All these packages need to be cross-compiled. To make things clear and non-ambiguous, even if you have `CC` set up in your environment variables, pass `--build` and `--host` arguments to the `./configure` script of all these packages. A typical command is:

```
./configure --build=i686-pc-linux-gnu --host=arm-open2x-linux --prefix=${GP2X_USER_PREFIX}
```

Here's the list of the requirements:

- SDL. 1.2.14 works zith the following settings: `./configure --prefix=$GP2X_USER_PREFIX --build=x86_64-pc-linux-gnu --host=arm-open2x-linux --disable-pulseaudio --disable-video-directfb`
- libtool. Install a 1.5.x version, and not 2.2.x. For some reasons, 2.2.x is unusable, it keeps on complaining that lt_libltdl_LTX_preloaded_symbols is not defined. Apparently the bug has already been reported. For Liquid War 6 needs, 1.5.x is very fine, use 1.5.26 for instance, it works well.
- GNU MP (version 4.3.1 reported to work)
- Guile (version 1.8.7 reported to work). You need to pass the `--witout-threads` switch to the `./configure` script else it will try (and fail!) to run a test program. Liquid War 6 does not use Guile threads, it does use threads but uses them "directly" outside the Guile layer.
- zlib (version 1.2.3 reported to work). Do not use `--build` and `--host` for this one, they are unsupported. Package compiles fine anyway.
- expat (version 2.0.1 reported to work).

- libpng (version 1.2.3 reported to work).
- libjpeg (version 7 reported to work).
- SQLite 3 (version 3.6.18 reported to work).
- libcURL (version 7.19.6 reported to work).

Next, one needs to install a special version of SDL, which targets the GP2X specifically. This is not a generic SDL, and it does have limitations, which are related to the GP2X peculiar hardware. There are installation instructions about how to do this. The following should work:

```
cvs -d :pserver:anonymous@cvs.sourceforge.net:/cvsroot/open2x login # blank password
cvs -d :pserver:anonymous@cvs.sourceforge.net:/cvsroot/open2x co libs-gp2x
```

## 3.8 Coding guidelines

### 3.8.1 Project goals reminder

One of the purposes of Liquid War 6 is to make a cleaner implementation of Liquid War than the previous one, namely Liquid War 5. While the latter has achieved the practical goal of providing a playable implementation of the game, it failed at providing an evolutive platform. Network capabilities where finally added to Liquid War 5, but anyone who played on Internet with someone a few hundreds of milliseconds away would agree that it's far from being perfect. The main reason for this is that it is really had to hack on Liquid War 5, especially when you are not the core developper. The core developper himself, even knowing all the various hacks in the game, is very quickly lost when trying to implement major changes.

To put it short, Liquid War 5 is a global variable hell, a pile of hacks on top of a quick and dirty implementation. Still, it works.

With Liquid War 6, the idea is to take the time to make something stable, something nice which will enable developpers to implement the cool features, and have fun along the way. Of course, this is only a dream, and in the (hopefully "very") long run, Liquid War 6 will also end up as a big unmaintainable mess, like any real-life program, until then, it should remain hackable.

### 3.8.2 Common sense

Here are a few guidelines which I think are common sense advice, but they are still worth mentionning:

- try and respect the GNU coding standards;
- absolutely no `strcpy` or `sprintf` anywhere in the code. Nowhere. Use their equivalent `strncpy` and `snprintf` systematically, as they are part of the glibc and are an order of magnitude safer. Moreover, Liquid War 6 provides wrappers, such as `lw6sys_new_sprintf` which handles all the nasty dirty memory allocation stuff for you;
- keep global variables for when there is something truely global, and even in that case try to fit them in clearly identified structures.

### 3.8.3 Unitary tests

Each of the internal libraries in Liquid War has a "test" program associated with it. For instance `liquidwar6sys-test` is associated to `libliquidwar6sys`, and its purpose is to test the features of this library.

While it is fairly easy to test out unitary functions which require no peculiar context, testing high-level functions which requires files, graphical and possibly network contexts to exist is obviously harder to achieve. There's no easy way to draw the line, but the idea is to put in these test executables as many features as possible, to be sure that what is tested in them is rock solid, bullet proof, and that one can safely rely on it and trust that code when running it in a more complex environnement.

These test executables are also very good places to see a library API in action, find code fragments, and make experiments.

### 3.8.4 Memory allocation

Liquid War 6 provides macros to allocate and free memory. One should use them systematically, except when trying to free something allocated by another library, and in very special cases, mostly concerning low-low level operations which are seldom hacked on.

Usage of macros `LW6SYS_MALLOC`, `LW6SYS_CALLOC` and `LW6SYS_FREE` is straightforward, read any random chunk of code, for instance `./src/lib/sys/sys-test.c` to see them in action. They are defined in `sys/sys.h`.

Once used, these macros will track every single call to `malloc` and `free`, and if there's a difference, it will report it. It will also help you by showing what's in the non-freed memory area, at which line of code it has been allocated, and when. This is very usefull to track down memory leaks. Of course a debugger could tell you some of these informations, but experience shows than when you encounter a memory bug, it's very often impossible to reproduce it. So you one wastes time trying to reproduce the bug, whereas with this tool you have the information reported just when the problem happens.

### 3.8.5 Private and public interfaces

Each library exports a public interface and hides its internal. Since Liquid War 6 uses standard C and no C++, there's no real standard way to handle public/private features. The convention used in Liquid War 6 is to show internal structures as opaque pointers (`void *`) whenever some function needs to operate on a structure which has possibly private fields. This way the caller function has no way to access the internals, and we are sure that no reference to any internal implementation specific feature will appear.

Here's a code excerpt from `src/gfx/setup.c`:

```
void _lw6gfx_quit(_LW6GFX_CONTEXT *context) {
  /*
   * Implementation here.
   */
[...]
}

void lw6gfx_quit(void *context) {
  _lw6gfx_quit((_LW6GFX_CONTEXT *) context);
```

```
}
```

The function `_lw6gfx_quit` (note the "_") is internal, declared in `internal.h` whereas the function `lw6gfx_quit` is public, and is therefore exported in `gfx.h`.

This way, functions in the program using `lw6gfx_quit` do not know what is in the `_LW6GFX_CONTEXT` structure, and they need not know it.

This does not mean it is not possible to have public structures, only these structures must reflect some truely public, accessible and safe to access structures.

### 3.8.6 Audit the code

Liquid War 6 is regularly audited with automated tools. You might need to pass `--enable-gcov` to `--configure` if you want to use thes tools yourself. More precisely:

- lcov is run, ideally with each release - but it's not garanteed, check the output date and time - and the output is available online on `http://www.gnu.org/software/liquidwar6/coverage/`.
- GNU global is run too, ideally with each release - again, check the output date and time - and the output is available online on `http://www.gnu.org/software/liquidwar6/global/`.
- pmccabe reports cyclomatic complexity. It shows where the code is too complex and should probably be rewritten. Output is post-processed using pmccabe2html from gnulib. The output is available online on `http://www.gnu.org/software/liquidwar6/cyclo/`.
- Valgrind is run as well, it should report absolutely no leak on all the core sub-libraries, eg running `liquidwar6ker-test` or `liquidwar6ker-pil`. Bits of code which depend on other libraries are a different story, for some projects on which Liquid War 6 depends might, for some reason, raise warnings. But as far as Liquid War 6 is concerned, the goal is simple: zero leak.
- Liquid War 6 is referenced on ohloh. Visit `http://www.ohloh.net/p/liquidwar6` to get time-based statistics and facts about the source code.

Those tools certainly don't garantee the code is perfect, but they do help improving the quality of the program. If you hack, it's recommended you give them a try.

## 3.9 Using the console

The console can be activated by passing `--display-console` when starting the game or by using the system options menu.

When the console is activated, a `lw6>` prompt should appear in the terminal which launched the program. If you started Liquid War 6 by clicking on an icon, console probably won't work at all since `stdout` and `stdin` won't be attached to anything.

The console allows you to type arbitray Scheme/Guile code.

Try, for instance:

```
(+ 1 2)
(display "foo\n")
```

You can really break things with this console, it gives you a direct access to all the program internals. At least, all the values which are accessible through the script interface, that is, many of them.

You can call any internal C function which has been exported to Guile, here are some examples:

```
(c-lw6sys-timestamp)
(c-lw6bot-get-backends)
(c-lw6sys-sleep 2.0)
(lw6-config-get-number "zoom")
(lw6-config-set-number! "zoom" 0.9)
(lw6-config-get-number "zoom")
```

While syntax (and possibly other) errors will be trapped by the interpreter, note that if you break things inside the game by, say, changing some global value, or in a general manner cause an error elsewhere in the code, the game will really raise a fatal error and stop. That's how you can "break things".

Still, this console is a very powerfull tool, very usefull for debugging but also for tweaking the game without restarting it and/or navigating through the menu interface.

## 3.10 Advanced tweaking

### 3.10.1 Hacking ressources

Liquid War 6 tries to have as few hardcoded data as possible. So many constants, and pretty much all the image files, are accessible in the data directory. You can know where it is by launching `liquidwar6 --show-data-dir`. If you look in this directory you'll find different files, among them XML files.

Let's take an example. Try and find the file `gfx/gl/hud/floating/gl-floating-const.xml`. Edit the line with the `clock-y1` entry. Change the number after `"value"`. Re-run the program. Play a game. What happens? Logically you should see that "something" is not displayed at the same place than before.

You could also modify the textures (JPEG and PNG files). In a general manner it's more cautious to keep them the same size but it depends, sometimes other sizes will work as well.

Many of these parameters are really too technical and obscure to have their place in the main config file (which is already rather big). Use at your own risks, you can really break things touching this, but you can also find out lots of things can be tuned.

### 3.10.2 Optimize for speed

Todo...

## 3.11 Writing modules

Todo...

## 3.12 Use as a library

Todo...

## 3.13 Network protocol

This section describes how Liquid War 6 handles network messages. Note that for now this is purely theorical, more of a draft, a plan, it might change before being implemented.

### 3.13.1 No server, no client, only nodes

Liquid War 6 does not really have the notion of server or client, any instance of the program can act as both server and client, therefore we use the term node.

A node listens on a given port, in both TCP and UDP, and can connect to other nodes on the same port. The main identifier of a node is its public url, which is typically of the form `http://<ip-address>:<port>/`. This url is very important for it is (or at least should be) a unique identifier of the node over the network.

Liquid War has 3 ways to communicate:

- raw TCP, this is the LW6 protocol, the easiest to implement and debug, probably the most reliable one, but not always the fastest. This involves the two modules `mod-tcp` and `mod-tcpd`.
- HTTP over TCP, this is a hack which allows the game to communicate through HTTP proxies for instance. Additionnally, the fact any node is a web server enables peering with a simple web browser. Web server facility requires `mod-httpd` and client part requires `mod-http` which might or not be available, depending on how the game was compiled.
- raw UDP, this is another version of the LW6 protocol, this is in theory the fastest way to communicate, it requires `mod-udp` and `mod-udpd` to work. Using UDP only was not an option when conceiving Liquid War since it's interesting to have other solutions if, for instance, a firewall does not allow you to use UDP the way you want.

On each of these channels, messages can be exchanged in two modes, an "out of band" mode (AKA "oob"), and a regular message oriented, here we speak of "connection".

### 3.13.2 Out of band messages

There are only 3 out of band messages:

- `PING`: requests for a simple `PONG http://server:port/` answer, this is just to check if a server is a valid server, and if the URL we used to connect on it is the correct one.
- `INFO`: requests for a list of key/attributes pairs, which describe the node, telling for instance its version, its uptime, and so on.
- `LIST`: requests for a list of other nodess this node is aware of.

You can test out of band messages by simply connecting on your server with a command like:

```
telnet localhost 8056
```

At the telnet prompt, simply type:

```
INFO
```

and press return, and you should have a description of your node.

The complete syntax of OOB messages is:

```
<COMMAND> [password] [url]
```

The `password` and `url` parameters are optionnal. `password` can contain either the plain text password or a checksum calculated from the password which is, for security reasons, seeded with the public url of the node we're connecting to, so that this password can't be re-used on another node. `url` is simply a clue we give to the other node to help find us, the other node will automatically try to detect our IP address and use standard LW6 port 8056, but if for some reason we use a different setting, this is a good way to pass the hint.

As far as OOB is concerned, TCP and UDP work almost the same, HTTP is a bit different, the OOB commands are accessed through the following URLs:

- `/ping.txt`
- `/info.txt`
- `/list.txt`

### 3.13.3 Other raw technical stuff (WIP)

TCP messages:

```
LW6 [<passwd>] <version> <client-id>
<from-id> <to-id> <serial> <i> <n> <sig> MSG1
<from-id> <to-id> <serial> <i> <n> <sig> MSG2
```

TCP oobs:

```
<return> # only works anonymous, same as INFO
INFO [<passwd>] [<public-url>]
LIST [<passwd>] [<public-url>]
PING [<passwd>] [<public-url>]
```

UDP messages:

```
LW6 [<passwd>] <version> <client-id> <from-id> <to-id> <serial> <i> <n> <sig> MSG1
LW6 [<passwd>] <version> <client-id> <from-id> <to-id> <serial> <i> <n> <sig> MSG2
```

UDP oobs:

```
INFO [<passwd>] [<public-url>]
LIST [<passwd>] [<public-url>]
PING [<passwd>] [<public-url>]
```

HTTP messages:

client id & password passed in HTTP headers

```
/lw6/version/<from-id>/<to-id>/<serial>/<i>/<n>/sig/MSG1
/lw6/version/<from-id>/<to-id>/<serial>/<i>/<n>/sig/MSG2
```

HTTP public URLs:

```
/ -> index.html
/index.html
/favicon.ico
/screenshot.jpeg
/robots.txt
/gpl.txt
/info.txt
/list.txt
```

`/ping.txt`

MSG syntax:

```
<round> <server-id> <command> <arg1> ... <argN>
```

COMMAND examples:

```
2 1234abcd1234abcd REGISTER
3 1234abcd1234abcd ADD 5678 YELLOW
4 1234abcd1234abcd SET 5678 20 5
10 1234abcd1234abcd NOP
400 1234abcd1234abcd REMOVE 5678
1000 1234abcd1234abcd UNREGISTER
```

Sig is a checksum on string:

```
<from-id> <to-id> <serial> <i> <n> MSG
```

## 3.14 Technical HOWTOs

### 3.14.1 Release check-list

Summary off all operations required for a release:

- check the value of `LW6MAP_RULES_DEFAULT_EXP` and default for `--skip-network`, which might have been changed will developping.
- in `./src`, run `./indent.sh`.
- in `./doc`, run `./gdoc-update.sh`.
- edit `NEWS` file, in both `liquidwar6` and `liquidwar6-extra-maps`. Check `ChangeLog` is OK.
- update the version history in `doc/liquidwar6.texi`.
- update `debian/changelog` files in both main and extra maps packages.
- run `make distcheck`... (at least!)
- build `RPM` package (`make -C pkg rpm`), check `yum install` produces a working installation, also check the `rpm -e` command to verify uninstalling is OK too.
- build `.exe` main binary on Microsoft Windows then go back to GNU/Linux and build `.exe` installer (`make -C pkg installer`), go back to Microsoft Windows and test the installer (there are often problems at this stage because of missing libraries or other files...).
- build `.dmg` Mac OS X disk image, check it works even when `/opt` and `/usr/local` or (re)moved, this is important, else execution might rely on binaries which are only on the development machine and do not ship with game.
- upload files (doc on http://savannah.gnu.org/maintenance/DownloadArea), with a command like `rsync --rsh=ssh --recursive ./version/ login@dl.sv.nongnu.org:/releases/liquidwar6/version/`. Each file must have its `.sig` corresponding file.
- update online docs with `gendocs.sh`, carefull, `liquidwar6.html` is suppressed by this, need to re-create it from previous version and/or `index.html` which is the same.
- update `index.html`, `liquidwar6.html` and `liquidwar6.fr.html` so that they reflect the latest release. Check download links are OK.

- run `./configure --enable-gcov ; make clean ; make`. Then run `src/liquidwar6 --test`, stay here and get ready to respond interactively to various questions. Then cd to `./doc/coverage` and run `make opt`. Copy files to web CVS, sync them.
- cd to `./doc/global` and run `make opt`. Copy files to web CVS, sync them.
- cd to `./doc/cyclo` and run `make opt`. Copy files to web CVS, sync them.
- post news on https://savannah.gnu.org/news/?group=liquidwar6, http://lists.gnu.org/mailman/listinfo/help-liquidwar6 and http://lists.gnu.org/mailman/listinfo/info-liquidwar6.

### 3.14.2 Add a new option

This describes how to add a new option to the game.

- edit `src/lib/def/def-list.txt`
- in `src/lib/def/def-update.py` run `./def-update.py`. This will automatically fill `src/lib/def/def.h` and `script/def.scm`. In the code, you should always use `LW6DEF_<OPTION>` in C and `lw6def-<option>` in scheme to refer to the option. This does help avoiding typesetting errors.
- add the entry to `src/lib/hlp/hlp-list.c`, choose a category for it
- add the entry to `src/lib/hlp/hlp-reference.c`, give it a type, documentation string and default values if needed
- to sort `src/lib/def/def-list.txt` a common practice is to fill it with the output of `liquidwar6 --list` once the program has been compiled and is aware of the new option.

Unless this is done, program won't accept the option.

### 3.14.3 Add a new internal library

This describes how to add a new `libxyz` internal library:

- create a new `src/lib/xyz` directory. The convention is to use 3 letters names and prefix every global identifier with `lw6xyz`.
- copy `Makefile.am`, `xyz.h`, `xyz-test.c` and `xyz-testmain.c` from an existing internal library (`libnod` is a good source, it does not have complex dependencies).
- edit `Makefile.am` to fill requirements, make necessary adjustments to other files (many string replaces to make, both lowercase and uppercase).
- add the entry in the `SUBDIRS` and `LW6_LIBS` sections of `src/lib/Makefile.am`
- add the entry in the `AC_CONFIG_FILES` of `./configure.ac`.
- run `automake` and `autoconf`.
- edit `src/lib/lw6-options.c` and add a call to `lw6xyz_test()` for both "check" and "test" cases.
- edit `src/lib/lw6-test.c` and add a reference to the `lw6xzy_test()` function.
- in every internal `abc` library that depends on `xyz`, edit the `lw6abc_test` function so that it contains a reference to `lw6xzy_test`.
- in every internal `abc` library that depends on `xyz/xyz.h`, edit the `abc/abc.h` header so that it includes `xzy/xyz.h`. Also edit `src/lib/liquidwar6.h.in`.

- in every internal `abc` library that depends on `libxyz`, add a reference to `../xyz/libxyz.la` inf the `_LDADD` section.
- edit `doc/gdoc-update.sh` and add the entry for `xyz`.
- edit `doc/Makefile.am` and add `xyz-gdoc.texi` in `gdoc_TEXINFOS`.
- in `./doc`, run `./gdoc-update.sh`.
- edit `doc/liquidwar6.texi` to and a new node/section for this internal library.
- edit `doc/deps.dot` to update dependencies.
- run `./configure && make`, fix code if needed.

### 3.14.4 Add a new module

This describes how to add a new `mod-ab` module, for instance a new bot, but gfx, snd, cli or srv backends should work pretty much the same:

- add a new entry in `src/lib/bot/Makefile.am`
- create the subdir `src/lib/bot/mod-ab`, with its `Makefile.am` (inspired from other existing modules)
- add the entry in `configure.ac` so that `src/lib/bot/mod-ab/Makefile` is generated.
- edit `doc/gdoc-update.sh` and add an entry for `mod-ab`
- edit `doc/Makefile.am` and add `mod-ab-gdoc.texi` in `gdoc_TEXINFOS`.
- in `./doc`, run `./gdoc-update.sh`.
- edit `doc/liquidwar6texi` to add a new node/section for this module.
- edit `doc/deps.dot` to update dependencies.
- edit `src/lib/bot/bot-test.c`, change the value of `TEST_NB_BACKENDS` and modify the code so that the new `ab` module is tested too.
- edit `src/lib/bot/bot-register.c`, the code must updated pretty much in every place with the conditionnal `LW6_ALLINONE`, you need to add the new module.
- run `automake`, `autoconf`, `./configure` and `make`.

## 3.15 Using GNU Arch

### 3.15.1 About GNU Arch

Since March, 4th 2010, Liquid War 6 uses GIT to handle source code, track changes, branches, and the rest. It replaces the GNU Arch repository. This old repository contains all sources up to version 0.0.7beta, following versions, including 0.0.8beta, must be retrieved from GIT.

So the following informations only concern those who are interested in previous versions of the game. Anybody else - probably you - should use GIT instead.

See Section 3.16 [Using GIT], page 54.

Still, this quick Arch survival guide is kept in the documentation.

Read the GNU Arch tutorial to learn how Arch works. Note that there are many other source control managers available, some of which provide functionnalities similar to GNU Arch / tla. GNU Arch has been chosen for Liquid War 6 because:

- it is Free Software,
- it is not limited to per-file commits like CVS, and supports atomic commits involving several files,
- it is distributed,
- it enables developpers to sign each of their contributions,
- it was already available back in 2005.

### 3.15.2 Getting the latest version from the repository

The repository for Liquid War 6 is accessible on http://arch.savannah.gnu.org/archives/liquidwar6. This is a read-only access, but with the distributed nature of GNU Arch, it still allows you to keep track of your own changes, and submit patches. Accessing it in read/write mode with sftp requires a Savannah account and special rights on the Liquid War 6 project.

Here are typicall commands one can use to get Liquid War 6 source from the GNU Arch repository:

```
tla register-archive http://arch.savannah.gnu.org/archives/liquidwar6
tla get -A liquidwar6@sv.gnu.org liquidwar6--beta
```

All the patches in the archive are signed with GnuPG, so you can check their authenticity with my public key.

You might need to edit your `$HOME/.arch-params/signing/=default.check` file and put the following text in it:

```
tla-gpg-check gpg_command="gpg --verify-files -"
```

### 3.15.3 Setting up your own arch repository

This section is for those who want to hack the game and set up their own repositories. This will enable you to keep track of your patches, package them, and help the core maintainer merging them in the main repository.

You can introduce yourself and create a repository by issuing commands like:

You can introduce yourself and create a repository by issuing commands like:

```
tla my-id me@home.net
tla register-archive me@home.net--2008 /home/me/tla-archives
```

Then, you can get create your own repository, with a command like:

```
tla tag -S liquidwar6@sv.gnu.org/liquidwar6--beta--0.1 me@home.net--2008/liquidwar6--b
```

The idea is that you create, locally, a depot which has a name that matches the name on savannah (this is for convenience, you could technically give it any name...) and indicate that they represent, today, the same thing.

You can get a working copy of your depot with the command:

```
tla get me@home.net--2008/liquidwar6--beta--0.4
```

This will create a complete source tree, which you are free to modify, this is where you should hack.

### 3.15.4 Synchronizing your repository with upstream releases

To synchronize yourself with upstream developments, go into your copy (the directory created by `tla get`) and type:

```
tla star-merge liquidwar6@sv.gnu.org/liquidwar6--beta--0.1
```

This will apply locally all the changes that happened since the last synchronization. Of course this is one way to work, you can decide to cherry pick patches and such stuff, but for most dayly uses, a good'ol `star-merge` is fine.

Not that `star-merge` will only apply patches on your working copy, not on your repository. The only way to actually commit the modifications on the repository is to use the `commit` command.

### 3.15.5 Submitting patches

When using Arch, you can of course still send patches created with `diff`, or even send updated files directly, the way you would without revision control.

But it can be more convenient to either

- Send the patches stored in the depot (`/home/me/tla-archives` in our example).
- Make patches using `tla mkpatch`.

Here's an example of an `mkpatch` command, and which will compute the differences between a previous `liquidwar6--beta--0.4--patch-2` snapshot and a not yet commited latest version:

```
tla mkpatch {arch}/++pristine-trees/unlocked/liquidwar6/liquidwar6--beta/liquidwar6--b
```

This will create a `my-patch` directory, which can be gzipped and sent by mail.

### 3.15.6 Recover from broken lock

Sometimes, when signing a patch, you might enter the wrong passphrase several times, or you might press CTRL+D inadvertantly. In that case, tla will be in a half-broken state, telling you it can't acquire revision lock... A quick workarround for this is to go to the depot, find the latest patch, and in this repository, create the following folders:

```
++revision-lock/+contents
```

Both are directories, note the two `++` and the single `+`. the `+contents` directory can be empty. Once you've done this, try to re-commit.

## 3.16 Using GIT

### 3.16.1 About GIT

There's no CVS or Subversion (AKA "SVN") source depot for Liquid War 6. Instead, a GIT depot is used. GIT has many advantages over other source control managers (SCM), among them, it's distributed, like GNU Arch.

You can find interesting informations on GIT here:

- http://git-scm.com/documentation
- http://savannah.gnu.org/maintenance/UsingGit
- http://savannah.gnu.org/git/?group=liquidwar6

### 3.16.2 Getting the latest source

Simply install git and run the following command:

```
git clone git://git.sv.gnu.org/liquidwar6.git
```

If you are behing a firewall and can't have direct TCP/IP access:

```
git clone http://git.sv.gnu.org/r/liquidwar6.git
```

Additionnally, source can be browsed online here: http://git.savannah.gnu.org/cgit/liquidwar6.git

### 3.16.3 Developper access

You need an ssh access on Savannah and appropriate rights on the project, then you can type:

```
git clone login@git.sv.gnu.org:/srv/git/liquidwar6.git
```

### 3.16.4 Submitting patches

If you have developper access to the project, then a simply `git push` will commit your changes.

If not (that is, if you checked out anonymously using `git clone git://git.sv.gnu.org/liquidwar6.git` for instance, you can still submit patches. Follow these steps:

- edit the code, make your patches, commit to your local GIT tree
- run `git format-patch -p origin` this command will generate `.patch` files, one for each of you commits, which you can send by email. They can be easily integrated in the main source tree by using `git apply <file.patch>`.

Note that you can need to run `git format-patch -p master` (with `master` instead of `origin`) it not using a fresh checkout. Also consider adding the `--stdout` switch, eg `git format-patch -p master --stdout > my-changes.patch` if you're not using a fresh checkout.

# 4 Reference

This chapter is a technical reference. Most of its content is self-generated by the program itself. That is to say, most if its content is already available to you if you have the game installed. Running `liquidwar6 --list` and `liquidwar6 --about=<keyword>` is very likely to give you the very same informations, the advantage being that you'll be sure the information is up-to-date and corresponds to the exact version of the program you have. However, publishing this in a reader-friendly way is convenient, plus it enables web search engines to harvest the content.

## 4.1 Basic options

### 4.1.1 about

`--about=<value>` [Command-line option]

Type: string

Will allow you to get informations about a given keyword. Let's say that, for instance, you want informations about the keyword 'map-path'. Simply run 'liquidwar6 –about=map-path'. Note that this internal self-documentation system can describe command line switches as well as XML config file parameters or environment variables, and even some Guile script functions. The '–list' command line switch will give you the list of all available keywords.

### 4.1.2 audit

`--audit` [Command-line option]

Display all path values, defaults and current settings. This output is very usefull to track down problems such as missing directories, broken installations. If you get an error message that suggests some file is missing, then give this option a try.

### 4.1.3 copyright

`--copyright` [Command-line option]

Returns the copyright notice for the program.

### 4.1.4 debug

`--debug` [Command-line option]

Enables debug mode. This will turn on maximum log information, and display everything on stderr, even messages which are normally only stored in the log file.

### 4.1.5 defaults

`--defaults` [Command-line option]

Clears the config file and run the game with default settings. Use this if you suspect you have broken something by tweaking user settings, or when upgrading the game to a new version.

### 4.1.6 help

`--help` [Command-line option]
Returns a short help for the program.

### 4.1.7 host

`--host` [Command-line option]
Display all known system host properties, including os and cpu informations.

### 4.1.8 list

`--list` [Command-line option]
Returns the list of all keywords which can be queried for information. This includes command-line options, environment variables, and so on. This is the companion option of '–about'. Results obtained with '–list' can be passed to '–about'.

### 4.1.9 modules

`--modules` [Command-line option]
Tells which modules have been enabled when the game was compiled. It's still possible to add or remove modules afterwards, but this option allows you to know how things were at first.

### 4.1.10 pedigree

`--pedigree` [Command-line option]
Display all build values, these are general constants which can help debugging, tracing what binary you are running, and so on. It's a good idea to take a look at the output of 'pedigree' if you have problems running the game.

### 4.1.11 test

`--test` [Command-line option]
Runs a (hopefully) complete test suite which will call most internal Liquid War 6 functions and check out wether they work, in a simple context, without any game interference. Usefull for troubleshooting.

### 4.1.12 version

`--version` [Command-line option]
Returns the version of the program, as defined by the GNU Coding Standards.

## 4.2 Doc options

### 4.2.1 example-hints-xml

`--example-hints-xml` [Command-line option]
Dumps on stdout an example hints.xml file. Such a file is normally shipped with the game. It is indeed generated using this command.

### 4.2.2 example-rules-xml

`--example-rules-xml` [Command-line option]
Dumps on stdout an example options.xml file. Such a file is normally shipped with the game. It is indeed generated using this command.

### 4.2.3 example-style-xml

`--example-style-xml` [Command-line option]
Dumps on stdout an example style.xml file. Such a file is normally shipped with the game. It is indeed generated using this command.

### 4.2.4 example-teams-xml

`--example-teams-xml` [Command-line option]
Dumps on stdout an example teams.xml file. Such a file is normally shipped with the game. It is indeed generated using this command.

### 4.2.5 list-advanced

`--list-advanced` [Command-line option]
List advanced options which can be used for fine-tuning the game.

### 4.2.6 list-aliases

`--list-aliases` [Command-line option]
List the keyword aliases. These are here for convenience.

### 4.2.7 list-doc

`--list-doc` [Command-line option]
List documentation-related command line options. These commands allow you to list all the keywords related to a given domain.

### 4.2.8 list-funcs

`--list-funcs` [Command-line option]
List the C-functions which are exported to Guile, thus usable in scripts.

### 4.2.9 list-graphics

`--list-graphics` [Command-line option]
List graphics options (resolution, fullscreen...).

### 4.2.10 list-hooks

`--list-hooks` [Command-line option]
List user-modifiable hooks.

### 4.2.11 list-input

`--list-input` [Command-line option]
List input (AKA controls) related options. Use these to change keyboard, joystick and mouse settingds.

### 4.2.12 list-map

`--list-map` [Command-line option]
List map-related entries, excluding rules.xml, hints.xml and style.xml entries.

### 4.2.13 list-map-hints

`--list-map-hints` [Command-line option]
List 'hints.xml' entries. These parameters enable you to modify the behavior of the map loader.

### 4.2.14 list-map-rules

`--list-map-rules` [Command-line option]
List 'options.xml' entries. These parameters enable you to modify the gameplay.

### 4.2.15 list-map-style

`--list-map-style` [Command-line option]
List 'style.xml' entries. These parameters enable you to modify the aspect of the game.

### 4.2.16 list-map-teams

`--list-map-teams` [Command-line option]
List 'teams.xml' entries. These parameters enable you to specify which teams should play on the map.

### 4.2.17 list-network

`--list-network` [Command-line option]
List network options.

### 4.2.18 list-path

`--list-path` [Command-line option]
List parameters which allow you to override the defaults of the game, and force the game your own file paths and directories.

### 4.2.19 list-players

`--list-players` [Command-line option]
List player-related entries, that is to say 'who plays'.

### 4.2.20 list-quick

`--list-quick` [Command-line option]
List quick help entries, this includes the GNU standard options and a few troubleshooting tools.

### 4.2.21 list-show

`--list-show` [Command-line option]
List command-line options which begin with '–show-...'. These will display on the console many internal parameters. Usefull when debugging.

### 4.2.22 list-sound

`--list-sound` [Command-line option]
List sound options (volume...).

### 4.2.23 list-team-colors

`--list-team-colors` [Command-line option]
List the team colors, there should be 10 of them

### 4.2.24 list-weapons

`--list-weapons` [Command-line option]
List the available weapons.

## 4.3 Show options

### 4.3.1 show-build-bin-id

`--show-build-bin-id` [Command-line option]
Shows the internal 'bin-id' value. This value does not mean anything in itself but it's supposed to change each time you compile the game.

### 4.3.2 show-build-bugs-url

`--show-build-bugs-url` [Command-line option]
Shows the URL to make bug reports.

### 4.3.3 show-build-cflags

`--show-build-cflags` [Command-line option]
Shows what value you should put in 'CFLAGS' (environment variable) if you want to compile programs that use Liquid War 6 as a library, and include 'liquidwar6.h'.

### 4.3.4 show-build-codename

`--show-build-codename` [Command-line option]
Shows the codename associated with this version, generally the name of someone famous who is war-related (a general, an emperor...).

### 4.3.5 show-build-configure-args

`--show-build-configure-args` [Command-line option]
Shows the arguments that have been passed to the GNU Autoconf './configure' script when building the program. This can be very usefull if you want to know how the program has been built.

### 4.3.6 show-build-copyright

`--show-build-copyright` [Command-line option]
Shows a very short copyright notice.

### 4.3.7 show-build-datadir

`--show-build-datadir` [Command-line option]
Shows the 'datadir' value as passed to the GNU Autoconf './configure' script when compiling the program. Default is '/usr/local/share'. This is the generic, non Liquid War 6 specific data directory. Liquid War 6 related data is stored elsewhere (usually in a sub-directory) see the 'data-dir' switch for more information. 'datadir' is not 'data-dir'. That's the point.

### 4.3.8 show-build-date

`--show-build-date` [Command-line option]
Shows the date when the binary was compiled.

### 4.3.9 show-build-docdir

`--show-build-docdir` [Command-line option]
Shows the 'docdir' value as passed to the GNU Autoconf './configure' script when compiling the program. Default is '/usr/local/share/doc/liquidwar6'.

### 4.3.10 show-build-enable-allinone

`--show-build-enable-allinone` [Command-line option]
Shows wether the 'allinone' option has been chosen when building the game. This depends on parameters passed to './configure'.

### 4.3.11 show-build-enable-console

`--show-build-enable-console` [Command-line option]
Shows wether the console has been enabled when building the game. This depends on parameters passed to './configure' and also on the presence of ncurses and readline.

### 4.3.12 show-build-enable-fullstatic

`--show-build-enable-fullstatic` [Command-line option]
Shows wether the 'fullstatic' option has been chosen when building the game. This depends on parameters passed to './configure'.

### 4.3.13 show-build-enable-gcov

`--show-build-enable-gcov` [Command-line option]
Shows wether the game was build with suitable informations for gcov. This depends on parameters passed to './configure'.

### 4.3.14 show-build-enable-gprof

`--show-build-enable-gprof` [Command-line option]
Shows wether the game was build with suitable informations for gprof. This depends on parameters passed to './configure'.

### 4.3.15 show-build-enable-gtk

`--show-build-enable-gtk` [Command-line option]
Shows wether GTK+ support has been enabled when building the game. This depends on parameters passed to './configure' and also on the presence of GTK+ headers and libs. It uses pkg-config to detect it.

### 4.3.16 show-build-enable-instrument

`--show-build-enable-instrument` [Command-line option]
Shows wether the game was build with the '-finstrument-functions' GCC switch. This depends on parameters passed to './configure'.

### 4.3.17 show-build-enable-mod-csound

`--show-build-enable-mod-csound` [Command-line option]
Shows wether the mod-csound audio backend has been enabled when building the game. This depends on parameters passed to './configure' and also on the presence of the csound library.

### 4.3.18 show-build-enable-mod-gl

`--show-build-enable-mod-gl` [Command-line option]
Shows wether the mod-gl graphical backend has been enabled when building the game. This depends on parameters passed to './configure' and also on the presence of SDL and related libraries.

### 4.3.19 show-build-enable-mod-http

`--show-build-enable-mod-http` [Command-line option]
Shows wether the mod-http network backend has been enabled when building the game. This depends on parameters passed to './configure' and also on the presence of libCurl.

### 4.3.20 show-build-enable-mod-ogg

`--show-build-enable-mod-ogg` [Command-line option]
Shows wether the mod-ogg audio backend has been enabled when building the game. This depends on parameters passed to './configure' and also on the presence of SDL and related libraries.

### 4.3.21 show-build-enable-openmp

`--show-build-enable-openmp` [Command-line option]
Shows wether the program was built with OpenMP support. This depends on parameters passed to './configure'.

### 4.3.22 show-build-enable-optimize

`--show-build-enable-optimize` [Command-line option]
Shows wether the 'optimize' option has been chosen when building the game. This depends on parameters passed to './configure'.

### 4.3.23 show-build-enable-paranoid

`--show-build-enable-paranoid` [Command-line option]
Shows wether the game was build with paranoid memory management. This is for debugging purposes, the default already includes some controls, with turned it's really... paranoid.

### 4.3.24 show-build-enable-profiler

`--show-build-enable-profiler` [Command-line option]
Shows wether the game was build with Google Profiler support. This depends on parameters passed to './configure'.

### 4.3.25 show-build-enable-valgrind

`--show-build-enable-valgrind` [Command-line option]
Shows wether the game was build with valgrind later use in mind. This depends on parameters passed to './configure'.

### 4.3.26 show-build-endianness

`--show-build-endianness` [Command-line option]
Returns the endianness. 'little' corresponds to x86-like systems, 'big' to ppc-like systems.

### 4.3.27 show-build-gcc-version

`--show-build-gcc-version` [Command-line option]
Returns the version of the GNU C compiler which was used to compile the program.

### 4.3.28 show-build-gnu

`--show-build-gnu` [Command-line option]
Returns 1 (true) if host OS is a GNU system, or at least has been considered as such when compiling, 0 (false) if not.

### 4.3.29 show-build-gp2x

`--show-build-gp2x` [Command-line option]
Returns 1 (true) if host is a GP2X, 0 (false) if not.

### 4.3.30 show-build-home-url

`--show-build-home-url` [Command-line option]
Shows the URL of the program, its homepage.

### 4.3.31 show-build-host-cpu

`--show-build-host-cpu` [Command-line option]
Shows the host CPU, as defined by 'host_cpu' in GNU Autoconf.

### 4.3.32 show-build-host-os

`--show-build-host-os` [Command-line option]
Shows the host OS, as defined by 'host_os' in GNU Autoconf.

### 4.3.33 show-build-hostname

`--show-build-hostname` [Command-line option]
Shows the name of the host where the binary was compiled.

### 4.3.34 show-build-includedir

`--show-build-includedir` [Command-line option]
Shows the 'includedir' value as passed to the GNU Autoconf './configure' script when compiling the program. Default is '/usr/local/include'.

### 4.3.35 show-build-ldflags

`--show-build-ldflags` [Command-line option]
Shows what value you should put in 'LDFLAGS' (environment variable) if you want to link programs against libliquidwar6.

### 4.3.36 show-build-libdir

`--show-build-libdir` [Command-line option]
Shows the 'libdir' value as passed to the GNU Autoconf './configure' script when compiling the program. Default is '/usr/local/lib'. This is the generic, non Liquid War 6 specific library directory. Dedicated Liquid War 6 modules are stored elsewhere (usually in a sub-directory) see the 'mod-dir' switch for more information.

### 4.3.37 show-build-license

`--show-build-license` [Command-line option]
Shows the license of the program (GNU GPL v3 or later).

### 4.3.38 show-build-localedir

`--show-build-localedir` [Command-line option]
Shows the 'localedir' value as passed to the GNU Autoconf './configure' script when compiling the program. Default is '/usr/local/share/locale'.

### 4.3.39 show-build-mac-os-x

`--show-build-mac-os-x` [Command-line option]
Returns 1 (true) if host OS is Mac OS X, 0 (false) if not.

### 4.3.40 show-build-md5sum

`--show-build-md5sum` [Command-line option]
Shows the MD5 checksum, which has been calculated from the C source files. Complementary with 'show-build-stamp'.

### 4.3.41 show-build-ms-windows

`--show-build-ms-windows` [Command-line option]
Returns 1 (true) if host OS is Microsoft Windows, 0 (false) if not.

### 4.3.42 show-build-package-name

`--show-build-package-name` [Command-line option]
Shows the package name, that is, 'Liquid War 6'.

### 4.3.43 show-build-package-string

`--show-build-package-string` [Command-line option]
Shows the package string, that is, 'Liquid War 6 <version>

### 4.3.44 show-build-package-tarname

`--show-build-package-tarname` [Command-line option]
Shows the package tarname, that is, liquidwar6.

### 4.3.45 show-build-pointer-size

`--show-build-pointer-size` [Command-line option]
Returns the pointer size, in bytes. Should be 4 on 32-bit systems and 8 on 64-bit systems.

### 4.3.46 show-build-prefix

`--show-build-prefix` [Command-line option]
Shows the 'prefix' value as passed to the GNU Autoconf './configure' script when compiling the program. Default is '/usr/local'.

### 4.3.47 show-build-stamp

`--show-build-stamp` [Command-line option]
Shows the build stamp. A very usefull value, more precise than the version to track down binaries. It is incremented each time the core C code is updated. It won't reflect all the programs for it does not take scripts in account, but if you are running a work-in-progress version, it might be very convenient to use this to know what your are running exactly.

### 4.3.48 show-build-time

`--show-build-time` [Command-line option]
Shows the time when the binary was compiled.

### 4.3.49 show-build-top-srcdir

`--show-build-top-srcdir` [Command-line option]
Shows the top source directory on the machine where the binary was compiled.

### 4.3.50 show-build-unix

`--show-build-unix` [Command-line option]
Returns 1 (true) if host OS is a UNIX system, or at least has been considered as such when compiling, 0 (false) if not.

### 4.3.51 show-build-version

`--show-build-version` [Command-line option]
Shows the version. Note that this is different from the standard GNU 'version' command line option which shows a complete message with a short copyright notice. This one will just return the version, without the package tarname or anything else.

### 4.3.52 show-build-x86

`--show-build-x86` [Command-line option]
Tells wether the CPU belongs to x86 family.

### 4.3.53 show-config-file

`--show-config-file` [Command-line option]
Shows the config file path. Default is '$HOME/.liquidwar6/config.xml'.

### 4.3.54 show-cwd

`--show-cwd` [Command-line option]
Shows the current working directory, the value that the pwd command would return.

### 4.3.55 show-data-dir

`--show-data-dir` [Command-line option]
Shows the data directory path. This is where the games searches for most of its data,the most important exception being maps, which are stored elsewhere. Default is '/usr/local/share/liquidwar6-<version>/data'.

### 4.3.56 show-default-config-file

`--show-default-config-file` [Command-line option]
Shows the default config file path. Default is '$HOME/.liquidwar6/config.xml'.

### 4.3.57 show-default-data-dir

`--show-default-data-dir` [Command-line option]
Shows the default data directory path. This is where the games searches for most of its data,the most important exception being maps, which are stored elsewhere. Default is '/usr/local/share/liquidwar6-<version>/data'.

### 4.3.58 show-default-log-file

`--show-default-log-file` [Command-line option]
Shows the default log file path. Default is '$HOME/.liquidwar6/log.csv'.

### 4.3.59 show-default-map-dir

`--show-default-map-dir` [Command-line option]
Shows the default map directory. This is where builtin maps are stored. Default is '/usr/local/share/liquidwar6-<version>/map'.

### 4.3.60 show-default-map-path

`--show-default-map-path` [Command-line option]
Shows the default map search path. This is where the game searches for maps. It's the combination of command-line arguments and builtin paths. Might return more directories than the one specified in a single 'map-path=dir1:dir2' argument.

### 4.3.61 show-default-mod-dir

`--show-default-mod-dir` [Command-line option]
Shows the default module directory path. This is where all dynamically loaded modules are stored. Default is '/usr/local/lib/liquidwar6-<version>'.

### 4.3.62 show-default-music-dir

`--show-default-music-dir` [Command-line option]
Shows the default music directory. This is where builtin musics are stored. Default is '/usr/local/share/liquidwar6-<version>/music'.

### 4.3.63 show-default-music-path

`--show-default-music-path` [Command-line option]
Shows the default music search path. This is where the game searches for musics. It's the combination of command-line arguments and builtin paths. Might return more directories than the one specified in a single 'music-path=dir1:dir2' argument.

### 4.3.64 show-default-prefix

`--show-default-prefix` [Command-line option]
Shows the default prefix used. This should logically be the value passed to the GNU Autoconf ./configure script when building the game. Most other path are deduced from this one. Default is '/usr/local'.

### 4.3.65 show-default-script-file

`--show-default-script-file` [Command-line option]

Shows the default main script file path. This file is very important, since the program is more or less a hudge scheme interpreter, and this file is the file loaded by Guile. In short, it is the main program. Default is '/usr/local/share/liquidwar6-<version>/script/liquidwar6.scm'.

### 4.3.66 show-default-user-dir

`--show-default-user-dir` [Command-line option]

Shows the default user directory path. This is where run-time data, config files, log files, are stored. Default is '$HOME/.liquidwar6/'.

### 4.3.67 show-log-file

`--show-log-file` [Command-line option]

Shows the log file path. Default is '$HOME/.liquidwar6/log.csv'.

### 4.3.68 show-map-dir

`--show-map-dir` [Command-line option]

Shows the map directory. This is where builtin maps are stored. Default is '/usr/local/share/liquidwar6-<version>/map'.

### 4.3.69 show-map-path

`--show-map-path` [Command-line option]

Shows the map search path. This is where the game searches for maps. It's the combination of command-line arguments and builtin paths. Might return more directories than the one specified in a single 'map-path=dir1:dir2' argument.

### 4.3.70 show-mod-dir

`--show-mod-dir` [Command-line option]

Shows the module directory path. This is where all dynamically loaded modules are stored. Default is '/usr/local/lib/liquidwar6-<version>'.

### 4.3.71 show-music-dir

`--show-music-dir` [Command-line option]

Shows the music directory. This is where builtin maps are stored. Default is '/usr/local/share/liquidwar6-<version>/music'.

### 4.3.72 show-music-path

`--show-music-path` [Command-line option]

Shows the music search path. This is where the game searches for musics. It's the combination of command-line arguments and builtin paths. Might return more directories than the one specified in a single 'music-path=dir1:dir2' argument.

### 4.3.73 show-prefix

`--show-prefix` [Command-line option]

Shows the prefix used. This should logically be the value passed to the GNU Autoconf ./configure script when building the game. Most other path are deduced from this one. Default is '/usr/local'.

### 4.3.74 show-run-dir

`--show-run-dir` [Command-line option]

Shows the run directory, usually the path where the binary is. It depends on how and where the program is launched. It is guessed from the argc/argv values at runtime.

### 4.3.75 show-script-file

`--show-script-file` [Command-line option]

Shows the main script file path. This file is very important, since the program is more or less a hudge scheme interpreter, and this file is the file loaded by Guile. In short, it is the main program. Default is '/usr/local/share/liquidwar6-<version>/script/liquidwar6.scm'.

### 4.3.76 show-user-dir

`--show-user-dir` [Command-line option]

Shows the user directory path. This is where run-time data, config files, log files, are stored. Default is '$HOME/.liquidwar6/'.

## 4.4 Path options

### 4.4.1 config-file

`--config-file` [Command-line option]

Type: string

Default value: $HOME/.liquidwar6/config.xml

Set the config file path. This enables you to use whatever config file you like, keeping all other informations in the same place.

### 4.4.2 data-dir

`--data-dir` [Command-line option]

Type: string

Default value: /usr/local/share/liquidwar6-<version>/data

Set the data directory. By changing ths value you'll be able to use an alternative data directory.

### 4.4.3 log-file

`--log-file=<value>` [Command-line option]
`LW6_LOG_FILE` [Environment variable]
`log-file` [XML key]

Type: string

Default value: $HOME/.liquidwar6/log.csv

Set the log file path. This enables you to use whatever log file you like, keeping all other informations in the same place.

### 4.4.4 map-dir

`--map-dir` [Command-line option]

Type: string

Default value: /usr/local/share/liquidwar6-<version>/map

Set the map directory path. By changing this value you'll be able to play with your own maps in your own directory. Note that there are other ways to achieve that, but using this option will work. However, a side effect is that you might not see builtin maps anymore.

### 4.4.5 map-path

`--map-path=<value>` [Command-line option]
`LW6_MAP_PATH` [Environment variable]
`map-path` [XML key]

Type: string

Default value: $HOME/.liquidwar6/map:/usr/local/share/liquidwar6-<version>/map

Set the map search path. By changing this value you'll be able to play with your own maps in your own directory. This is different from 'map-dir', since it includes 'map-dir', plus it adds a number of other search paths. Unlike most other parameters, the values given from the command-line, from the environment variables, or from the config file, are not overwritten, but appended. That is to say if you specify a 'map-path' with the command-line argument 'map-path=path', but also define the 'LW6_MAP_PATH' value and finally edit 'config.xml' to change the 'map-path' entry in it, you'll end up with the game searching for maps in all these directories. Additionnally, 'map-dir' and '<user-dir>/map' will always be in the list. Any given value can itself include several pathes, separated by the path separator. This separator is ':' on GNU/Linux, and ';' on Microsoft Windows. For instance, on a GNU/Linux box, you could use the command-line argument 'map-path=/foo/bar/map:/home/user/map/:/map'.

### 4.4.6 mod-dir

`--mod-dir` [Command-line option]

Type: string

Default value: /usr/local/lib/liquidwar6-<version>

Set the module directory path. By changing this you will load dynamic shared libraries (game specific modules such as the graphical backend) from an alternative place. Use this at your own risks, for there can always be a binary incompatibility. You've been warned.

### 4.4.7 music-dir

`--music-dir=<value>` [Command-line option]
`LW6_MUSIC_DIR` [Environment variable]
`music-dir` [XML key]

Type: string

Default value: /usr/local/share/liquidwar6-<version>/music

Set the music directory path. By changing this value you'll be able to use your own musics in your own directory. Note that there are other ways to achieve that, but using this option will work. The major side effect is that using this option, you really replace the existing builtin musics by your own. If you simply want to add musics you can store them in $HOME/.liquidwar6/music or in the map directory itself.

### 4.4.8 music-path

`--music-path=<value>` [Command-line option]
`LW6_MUSIC_PATH` [Environment variable]
`music-path` [XML key]

Type: string

Default value: $HOME/.liquidwar6/music:/usr/local/share/liquidwar6-<version>/music

Set the music search path. By changing this value you'll be able to play with your own musics in your own directory. This is different from 'music-dir', since it includes 'music-dir', plus it adds a number of other search paths. Unlike most other parameters, the values given from the command-line, from the environment variables, or from the config file, are not overwritten, but appended. That is to say if you specify a 'music-path' with the command-line argument 'music-path=path', but also define the 'LW6_MUSIC_PATH' value and finally edit 'config.xml' to change the 'music-path' entry in it, you'll end up with the game searching for musics in all these directories. Additionnally, 'music-dir' and '<user-dir>/music' will always be in the list. Any given value can itself include several pathes, separated by the path separator. This separator is ':' on GNU/Linux, and ';' on Microsoft Windows. For instance, on a GNU/Linux box, you could use the command-line argument 'music-path=/foo/bar/music:/home/user/music/:/music'.

### 4.4.9 prefix

`--prefix` [Command-line option]

Type: string

Default value: /usr/local

Override the prefix value given to the GNU Autoconf ./configure script when building the game. Not all path will be changed, some of them might remain the same,

for instance message translations (localedir). But most game-specific data including maps, graphics, sounds, will be searched according to the new given parameter.

### 4.4.10 script-file

`--script-file` [Command-line option]

Type: string

Default value: /usr/local/share/liquidwar6-<version>/script/liquidwar6.scm

Set the main script file path. This file is very important, since the program is more or less a hudge scheme interpreter, and this file is the file loaded by Guile. In short, it is the main program.

### 4.4.11 user-dir

`--user-dir=<value>` [Command-line option]
`LW6_USER_DIR` [Environment variable]
`user-dir` [XML key]

Type: string

Default value: $HOME/.liquidwar6

Set the user directory path. This is where run-time data, config files, log files, are stored. If you override this value, other parameters such as where the config and log files reside, will change.

## 4.5 Players options

### 4.5.1 player1-control

`--player1-control=<value>` [Command-line option]
`LW6_PLAYER1_CONTROL` [Environment variable]
`player1-control` [XML key]

Type: string

Default value: mouse

Control for the first player, must be mouse, keyboard, joystick1, joystick2 or custom.

### 4.5.2 player1-name

`--player1-name=<value>` [Command-line option]
`LW6_PLAYER1_NAME` [Environment variable]
`player1-name` [XML key]

Type: string

Default value: <username>

Name of the first player, the player used by default. A default value is provided, you can of course, change it at will.

### 4.5.3 player1-status

`--player1-status=<value>` [Command-line option]
`LW6_PLAYER1_STATUS` [Environment variable]
`player1-status` [XML key]

Type: boolean

Default value: true

Status of the first player, true if player is activated, false if idle.

### 4.5.4 player2-control

`--player2-control=<value>` [Command-line option]
`LW6_PLAYER2_CONTROL` [Environment variable]
`player2-control` [XML key]

Type: string

Default value: keyboard

Control for the second player, must be mouse, keyboard, joystick1, joystick2 or custom.

### 4.5.5 player2-name

`--player2-name=<value>` [Command-line option]
`LW6_PLAYER2_NAME` [Environment variable]
`player2-name` [XML key]

Type: string

Default value: player2-<hostname>

Name of the second player. A default value is provided, you'll certainly want to change it.

### 4.5.6 player2-status

`--player2-status=<value>` [Command-line option]
`LW6_PLAYER2_STATUS` [Environment variable]
`player2-status` [XML key]

Type: boolean

Default value: true

Status of the second player, true if player is activated, false if idle.

### 4.5.7 player3-control

`--player3-control=<value>` [Command-line option]
`LW6_PLAYER3_CONTROL` [Environment variable]
`player3-control` [XML key]

Type: string

Default value: joystick1

Control for the third player, must be mouse, keyboard, joystick1, joystick2 or custom.

### 4.5.8 player3-name

`--player3-name=<value>` [Command-line option]
`LW6_PLAYER3_NAME` [Environment variable]
`player3-name` [XML key]

Type: string

Default value: player3-<hostname>

Name of the third player. A default value is provided, you'll certainly want to change it.

### 4.5.9 player3-status

`--player3-status=<value>` [Command-line option]
`LW6_PLAYER3_STATUS` [Environment variable]
`player3-status` [XML key]

Type: boolean

Default value: false

Status of the third player, true if player is activated, false if idle.

### 4.5.10 player4-control

`--player4-control=<value>` [Command-line option]
`LW6_PLAYER4_CONTROL` [Environment variable]
`player4-control` [XML key]

Type: string

Default value: joystick2

Control for the fourth player, must be mouse, keyboard, joystick1, joystick2 or custom.

### 4.5.11 player4-name

`--player4-name=<value>` [Command-line option]
`LW6_PLAYER4_NAME` [Environment variable]
`player4-name` [XML key]

Type: string

Default value: player4-<hostname>

Name of the fourth player. A default value is provided, you'll certainly want to change it.

### 4.5.12 player4-status

`--player4-status=<value>` [Command-line option]
`LW6_PLAYER4_STATUS` [Environment variable]
`player4-status` [XML key]

Type: boolean

Default value: false

Status of the fourth player, true if player is activated, false if idle.

## 4.6 Input options

### 4.6.1 click-to-focus

`--click-to-focus=<value>` [Command-line option]
`LW6_CLICK_TO_FOCUS` [Environment variable]
`click-to-focus` [XML key]

Type: boolean

Default value: false

If set to true, you'll need to click with the mouse to select a menuitem or move the cursor in the game. If not, some actions will be taken automatically without the need to click.

### 4.6.2 cursor-sensitivity

`--cursor-sensitivity=<value>` [Command-line option]
`LW6_CURSOR_SENSITIVITY` [Environment variable]
`cursor-sensitivity` [XML key]

Type: float

Default value: 1.0

Keyboard and joystick sensitivity while moving the cursor. 1.0 is the default, 0.1 is slow, 10 is reponsive. This is used for moving the cursor during the game only, the option has no impact on menu navigation.

### 4.6.3 custom-alt

`--custom-alt=<value>` [Command-line option]
`LW6_CUSTOM_ALT` [Environment variable]
`custom-alt` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 110) ; SDLK_n

Guile custom code associated to the ALT key equivalent.

### 4.6.4 custom-ctrl

`--custom-ctrl=<value>` [Command-line option]
`LW6_CUSTOM_CTRL` [Environment variable]
`custom-ctrl` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 98) ; SDLK_b

Guile custom code associated to the CTRL key equivalent.

### 4.6.5 custom-down

`--custom-down=<value>` [Command-line option]
`LW6_CUSTOM_DOWN` [Environment variable]

`custom-down` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 100) ; SDLK_d

Guile custom code associated to the DOWN key equivalent.

### 4.6.6 custom-enter

`--custom-enter=<value>` [Command-line option]
`LW6_CUSTOM_ENTER` [Environment variable]
`custom-enter` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 103) ; SDLK_g

Guile custom code associated to the ENTER key equivalent.

### 4.6.7 custom-esc

`--custom-esc=<value>` [Command-line option]
`LW6_CUSTOM_ESC` [Environment variable]
`custom-esc` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 102) ; SDLK_f

Guile custom code associated to the ESC key equivalent.

### 4.6.8 custom-left

`--custom-left=<value>` [Command-line option]
`LW6_CUSTOM_LEFT` [Environment variable]
`custom-left` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 99) ; SDLK_c

Guile custom code associated to the LEFT key equivalent.

### 4.6.9 custom-pgdown

`--custom-pgdown=<value>` [Command-line option]
`LW6_CUSTOM_PGDOWN` [Environment variable]
`custom-pgdown` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 115) ; SDLK_s

Guile custom code associated to the PGDOWN key equivalent.

### 4.6.10 custom-pgup

`--custom-pgup=<value>` [Command-line option]
`LW6_CUSTOM_PGUP` [Environment variable]
`custom-pgup` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 119) ; SDLK_w

Guile custom code associated to the PGUP key equivalent.

### 4.6.11 custom-right

`--custom-right=<value>` [Command-line option]
`LW6_CUSTOM_RIGHT` [Environment variable]
`custom-right` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 118) ; SDLK_v

Guile custom code associated to the RIGHT key equivalent.

### 4.6.12 custom-up

`--custom-up=<value>` [Command-line option]
`LW6_CUSTOM_UP` [Environment variable]
`custom-up` [XML key]

Type: string

Default value: (c-lw6gui-keyboard-is-pressed 101) ; SDLK_e

Custom keycode to be used as the UP key equivalent.

### 4.6.13 double-click-delay

`--double-click-delay=<value>` [Command-line option]
`LW6_DOUBLE_CLICK_DELAY` [Environment variable]
`double-click-delay` [XML key]

Type: integer

Default value: 333

Time, in milliseconds, determining wether two consecutive clicks make a double-click or not.

### 4.6.14 max-cursor-speed

`--max-cursor-speed=<value>` [Command-line option]
`LW6_MAX_CURSOR_SPEED` [Environment variable]
`max-cursor-speed` [XML key]

Type: float

Default value: 10.0

Maximum cursor speed when cursor is controlled with keyboard or joystick joystick 1. Consider using cursor-sensitivity too.

### 4.6.15 mouse-sensitivity

`--mouse-sensitivity=<value>` [Command-line option]
`LW6_MOUSE_SENSITIVITY` [Environment variable]
`mouse-sensitivity` [XML key]

Type: float

Default value: 1.0

Mouse sensitivity, 1.0 is the default, 0.1 is slow, 10 is reponsive. This is used for moving the cursor during the game only, the option has no impact on menu navigation.

### 4.6.16 repeat-delay

`--repeat-delay=<value>` [Command-line option]
`LW6_REPEAT_DELAY` [Environment variable]
`repeat-delay` [XML key]

Type: integer

Default value: 500

Time, in milliseconds, before key repeat will start, use 0 to disable.

### 4.6.17 repeat-interval

`--repeat-interval=<value>` [Command-line option]
`LW6_REPEAT_INTERVAL` [Environment variable]
`repeat-interval` [XML key]

Type: integer

Default value: 100

Time, in milliseconds, between two repeats, once repeat has started, use 0 to disable.

### 4.6.18 use-double-click

`--use-double-click=<value>` [Command-line option]
`LW6_USE_DOUBLE_CLICK` [Environment variable]
`use-double-click` [XML key]

Type: boolean

Default value: false

Wether to use double-click feature, mostly usefull if running on a system that has only one button (such as a tablet-PC or anything with a tactile screen), if your mouse has three buttons, disabling this might avoid some confusion. Basically, if enabled, double-click is equivalent to right-click (fire) and triple-click is equivalent to middle-click (alternate fire).

### 4.6.19 use-esc-button

`--use-esc-button=<value>` [Command-line option]
`LW6_USE_ESC_BUTTON` [Environment variable]
`use-esc-button` [XML key]

Type: boolean

Default value: true

Decides wether to display an 'esc' (escape) button in the interface. This is usefull for people who control the game with the mouse only, and have a single buttons, or on a touchscreen.

### 4.6.20 zoom-step

`--zoom-step=<value>` [Command-line option]
`LW6_ZOOM_STEP` [Environment variable]
`zoom-step` [XML key]

Type: float

Default value: 1.1

A value, strictly greater than 1, which will be used when zooming. The greater it is, the more sensible the zoom is.

### 4.6.21 zoom-stick-delay

`--zoom-stick-delay=<value>` [Command-line option]
`LW6_ZOOM_STICK_DELAY` [Environment variable]
`zoom-stick-delay` [XML key]

Type: float

Default value: 1000

How long, in msec, the zoom will stick to its default value.

## 4.7 Graphics options

### 4.7.1 capture

`--capture=<value>` [Command-line option]
`LW6_CAPTURE` [Environment variable]
`capture` [XML key]

Type: boolean

Default value: false

Enables capture mode, in which a BMP file is dumped on the disk (in your user directory, search for a 'capture' sub-directory).

### 4.7.2 fullscreen

`--fullscreen=<value>` [Command-line option]
`LW6_FULLSCREEN` [Environment variable]
`fullscreen` [XML key]

Type: boolean

Default value: false

Force the game to fun fullscreen. Note that the graphics backend might ignore this hint.

### 4.7.3 gfx-backend

`--gfx-backend=<value>` [Command-line option]
`LW6_GFX_BACKEND` [Environment variable]
`gfx-backend` [XML key]

Type: string

Default value: gl

Sets the graphics backend AKA 'gfx' to use. For now the only choice is 'gl' and will use an OpenGL/SDL 3D-accelerated driver.

### 4.7.4 gfx-quality

`--gfx-quality=<value>` [Command-line option]
`LW6_GFX_QUALITY` [Environment variable]
`gfx-quality` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Sets the overall quality of the graphics backend. Depending on the backend, this can mean different things. For instance for the 'gl' backend, this can change texture filtering (nearest, linear, bilinear...). This is not the same as 'pixelize' which is a per-map option and emulates an old school appearance.

### 4.7.5 height

`--height=<value>` [Command-line option]
`LW6_HEIGHT` [Environment variable]
`height` [XML key]

Type: integer

Default value: -1

Run the game with the given screen height.Note that the graphics backend might ignore this hint. Use with its companion option 'width'. A negative value will force the use of a default value.

### 4.7.6 width

`--width=<value>` [Command-line option]
`LW6_WIDTH` [Environment variable]
`width` [XML key]

Type: integer

Default value: -1

Run the game with the given screen width. Note that the graphics backend might ignore this hint. Use with its companion option 'height'.A negative value will force the use of a default value.

### 4.7.7 windowed-mode-limit

`--windowed-mode-limit=<value>` [Command-line option]
`LW6_WINDOWED_MODE_LIMIT` [Environment variable]
`windowed-mode-limit` [XML key]

Type: float

Default value: 0.95

When switching back from fullscreen mode to windowed mode, if we're in maximum resolution, then this coefficient will be applied before resizing the window. The idea

is that (obviously) a windowed mode is prefered when a little smaller that totally fullscreen. So set this to a value just below 1.0.

## 4.8 Sound options

### 4.8.1 ambiance-exclude

`--ambiance-exclude=<value>` [Command-line option]
`LW6_AMBIANCE_EXCLUDE` [Environment variable]
`ambiance-exclude` [XML key]

Type: string

Default value:

If this string is present in a music file name, this file won't be played during the menus, it will be excluded from the list.

### 4.8.2 ambiance-file

`--ambiance-file=<value>` [Command-line option]
`LW6_AMBIANCE_FILE` [Environment variable]
`ambiance-file` [XML key]

Type: string

Default value:

A music file which will be used to be played during the menus. If not found, game will fallback on random files.

### 4.8.3 ambiance-filter

`--ambiance-filter=<value>` [Command-line option]
`LW6_AMBIANCE_FILTER` [Environment variable]
`ambiance-filter` [XML key]

Type: string

Default value: Chadburn

A music filter, used to select the files which are played while navigating in the menus. It works like 'music-filter' except this one is not related to a peculiar map. This is not a complex regex-enabled filter, just a plain string search. Even the '*' wildcard won't work.

### 4.8.4 fx-volume

`--fx-volume=<value>` [Command-line option]
`LW6_FX_VOLUME` [Environment variable]
`fx-volume` [XML key]

Type: float

Default value: 0.3 Min value: 0 Max value: 1

Set the sound effects volume. This is a floating point value. 0 is mute. Maximum value is 1.

### 4.8.5 music-volume

`--music-volume=<value>` [Command-line option]
`LW6_MUSIC_VOLUME` [Environment variable]
`music-volume` [XML key]

Type: float

Default value: 0.6 Min value: 0 Max value: 1

Set the music volume.This is a floating point value. 0 is mute. Maximum value is 1.

### 4.8.6 snd-backend

`--snd-backend=<value>` [Command-line option]
`LW6_SND_BACKEND` [Environment variable]
`snd-backend` [XML key]

Type: string

Default value: ogg

Sets the sound backend AKA 'snd' to use. Can be 'ogg' or 'csound' but only 'ogg' will produce sound in the current release.

### 4.8.7 water-volume

`--water-volume=<value>` [Command-line option]
`LW6_WATER_VOLUME` [Environment variable]
`water-volume` [XML key]

Type: float

Default value: 0.2 Min value: 0 Max value: 1

Set the volume for water sounds. This is a floating point value. 0 is mute. Maximum value is 1.

## 4.9 Network options

### 4.9.1 bind-ip

`--bind-ip=<value>` [Command-line option]
`LW6_BIND_IP` [Environment variable]
`bind-ip` [XML key]

Type: string

Default value: 0.0.0.0

The IP address to bind on when listening to network messages. You can use this to specifically use a given network interface, the default will listen on any available interface.

### 4.9.2 bind-port

`--bind-port=<value>` [Command-line option]
`LW6_BIND_PORT` [Environment variable]

`bind-port` [XML key]

Type: integer

Default value: 8056 Min value: 1 Max value: 65535

The IP port to bind on when listening to network messages. The default should work out of the box, and will ease up the discovery process. That is, if you use your own settings, automatic detection of your server by other servers might not work so well.

### 4.9.3 broadcast

`--broadcast=<value>` [Command-line option]
`LW6_BROADCAST` [Environment variable]
`broadcast` [XML key]

Type: boolean

Default value: true

Allows the program to send broadcast messages on the network. It can be usefull to disable those if you don't use UDP node discovery and/or if there's a sysadmin arround who does not enjoy permanent broadcasts on his LAN.

### 4.9.4 cli-backends

`--cli-backends=<value>` [Command-line option]
`LW6_CLI_BACKENDS` [Environment variable]
`cli-backends` [XML key]

Type: string

Default value: tcp,udp,http

The client backends to use. Most of the time the default is fine, change it only if you specifically want to disactivate some protocol, or if you want to activate a custom-made client backend. It's a comma separated list.

### 4.9.5 known-nodes

`--known-nodes=<value>` [Command-line option]
`LW6_KNOWN_NODES` [Environment variable]
`known-nodes` [XML key]

Type: string

Default value: http://ufoot.org:8056/,http://ufoot.hd.free.fr:8056/

List of known nodes, nodes which the program will try to contact first to get the list of other nodes. This is mostly usefull when program is launched for the first time, after this it should keep an up-to-date list of known servers in its internal database and automatically reconnect to them next time it starts. You might want to change this if you really want to connect to a given server which is not publically listed. The list is comma separated.

### 4.9.6 node-description

`--node-description=<value>` [Command-line option]
`LW6_NODE_DESCRIPTION` [Environment variable]

`node-description` [XML key]

Type: string

Default value: No description.

The description of your node, that is a text that describes your server. This will typically appear when pointing a web client on the public server URL, it is for general information, so if there's something special about your server, say it here.

### 4.9.7 node-title

`--node-title=<value>` [Command-line option]
`LW6_NODE_TITLE` [Environment variable]
`node-title` [XML key]

Type: string

Default value:

The title of your node, that is the name which will be displayed when listing servers. This is different from player name, for there can be several players on a single computer. By default this will be set to hostname.

### 4.9.8 password

`--password=<value>` [Command-line option]
`LW6_PASSWORD` [Environment variable]
`password` [XML key]

Type: string

Default value:

The password to use for network games. Do not use a valuable password, as this is stored as clear text on your hard drive. Still, the game will only send a hash/checksum of the password on the network so eavesdropper won't be able to read it. They can see the hash/checksum and use it if clever, but they can't guess the real password. A blank password means anyone can join your games when you act like a server.

### 4.9.9 public-url

`--public-url=<value>` [Command-line option]
`LW6_PUBLIC_URL` [Environment variable]
`public-url` [XML key]

Type: string

Default value:

The public URL of your server. By default the game will pick up one for you. In fact, the clients discovering your server should guess the public URL, probably http://<your-ip>:<your-port>/ but you might need to use your own settings if you are using NAT or an Apache reverse-proxy to rewrite HTTP requests.

### 4.9.10 skip-network

`--skip-network=<value>` [Command-line option]
`LW6_SKIP_NETWORK` [Environment variable]

`skip-network` [XML key]

Type: boolean

Default value: false

If set, then game won't do anything network related. No listen, no connect, no nothing. You are playing locally.

### 4.9.11 srv-backends

`--srv-backends=<value>` [Command-line option]
`LW6_SRV_BACKENDS` [Environment variable]
`srv-backends` [XML key]

Type: string

Default value: tcpd,udpd,httpd

The server backends to use. Most of the time the default is fine, change it only if you specifically want to disactivate some protocol, or if you want to activate a custom-made server backend. It's a comma separated list.

## 4.10 Map parameters

### 4.10.1 chosen-map

`--chosen-map=<value>` [Command-line option]
`LW6_CHOSEN_MAP` [Environment variable]
`chosen-map` [XML key]

Type: string

Default value: subflower

The last map chosen by the player, locally. This is the map which will be used for a quick-start game, a local game, or a game started as a server.

### 4.10.2 force

`--force=<value>` [Command-line option]
`LW6_FORCE` [Environment variable]
`force` [XML key]

Type: string

Default value: respawn-team,color-conflict-mode

A comma separated list of options which should be ignored when reading map XML files. For instance, if this contains 'rounds-per-sec,moves-per-round' then whatever values were defined for this in 'rules.xml', then game will ignore them and use the user's values, stored in 'config.xml', running the game at the requested speed. This ultimately allows the player to control everything despite the values set by the map designer.

### 4.10.3 use-cursor-texture

`--use-cursor-texture=<value>` [Command-line option]

`LW6_USE_CURSOR_TEXTURE` [Environment variable]
`use-cursor-texture` [XML key]

Type: boolean

Default value: true

Defines wether the cursor textures should be used. If unset, then the default builtin cursor texture will be used instead of the map specific one.

### 4.10.4 use-hints-xml

`--use-hints-xml=<value>` [Command-line option]
`LW6_USE_HINTS_XML` [Environment variable]
`use-hints-xml` [XML key]

Type: boolean

Default value: true

If set, then hints will be picked up from the map defined hints.xml, if it exists. This is the default.

### 4.10.5 use-music-file

`--use-music-file=<value>` [Command-line option]
`LW6_USE_MUSIC_FILE` [Environment variable]
`use-music-file` [XML key]

Type: boolean

Default value: true

If set, then the program will use the 'music-file' attribute to choose the music to play. If unset, then a random builtin music will be picked up, regardless of what is specified in 'music-file'.

### 4.10.6 use-rules-xml

`--use-rules-xml=<value>` [Command-line option]
`LW6_USE_RULES_XML` [Environment variable]
`use-rules-xml` [XML key]

Type: boolean

Default value: true

If set, then rules will be picked up from the map defined rules.xml, if it exists. This is the default. Use force-time and force-size to override this and use user-defined values anyway.

### 4.10.7 use-style-xml

`--use-style-xml=<value>` [Command-line option]
`LW6_USE_STYLE_XML` [Environment variable]
`use-style-xml` [XML key]

Type: boolean

Default value: true

If set, then style will be picked up from the map defined style.xml, if it exists. This is the default. Use force-time and force-background to override this and use user-defined values anyway.

### 4.10.8 use-teams-xml

`--use-teams-xml=<value>` [Command-line option]
`LW6_USE_TEAMS_XML` [Environment variable]
`use-teams-xml` [XML key]

Type: boolean

Default value: true

If set, then teams will be picked up from the map defined teams.xml, if it exists. This is the default. Use force-time and force-background to override this and use user-defined values anyway.

### 4.10.9 use-texture

`--use-texture=<value>` [Command-line option]
`LW6_USE_TEXTURE` [Environment variable]
`use-texture` [XML key]

Type: boolean

Default value: true

Defines wether the map texture should be used. Of course if there's no map texture, the texture... won't be used. But if there is one, this parameter will force the game to ignore it and play with solid colors. This probably won't look as nice as the textured map in most cases, but some players might find it more readable and confortable to play when throwing eye candy away.

## 4.11 Map rules.xml

### 4.11.1 boost-power

`--boost-power=<value>` [Command-line option]
`LW6_BOOST_POWER` [Environment variable]
`boost-power` [XML key]

Type: integer

Default value: 3 Min value: 1 Max value: 10

Defines how fast and powerfull the boost is. That is, if on 'boost.png' it's pitch black and this parameter is set to 3, then fighters will move and act 3 times than what they would do normally.

### 4.11.2 color-conflict-mode

`--color-conflict-mode=<value>` [Command-line option]
`LW6_COLOR_CONFLICT_MODE` [Environment variable]
`color-conflict-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

How to handle color conflicts, that is, when a player requests a color, but this color is already used, what should be done? If 0, wether a color already exists won't affect the color of a new cursor. If 1, then two players on the same computer will be allowed to share the same color/team, but if another computer is already playing with a color, any new computer will need to use another team. If 2, then it's impossible for a new cursor to use a pre-existing color, any new cursor will require a new color, if that color is already used, a new color will be picked randomly.

### 4.11.3 cursor-pot-init

`--cursor-pot-init=<value>` [Command-line option]
`LW6_CURSOR_POT_INIT` [Environment variable]
`cursor-pot-init` [XML key]

Type: integer

Default value: 100000 Min value: 5000 Max value: 500000

Defines the cursor potential at startup. Not really any reason to change it. Theorically, there could be maps where the default value doesn't fit, but none has been seen yet.

### 4.11.4 danger-power

`--danger-power=<value>` [Command-line option]
`LW6_DANGER_POWER` [Environment variable]
`danger-power` [XML key]

Type: integer

Default value: 200 Min value: 0 Max value: 10000

Defines how dangerous are the black zones defined in 'danger.png'. The value is used to decrease the fighter health at each move, so you should compare its value to something like 'fighter-attack'. Being on a dangerous zone is a bit like being attacked by an invisible and unknown ennemy.

### 4.11.5 exp

`--exp=<value>` [Command-line option]
`LW6_EXP` [Environment variable]
`exp` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 99

Level of experience (AKA exp) required to play the current level. If this level is validated (that is, won) then player will be granted with a level of exp+1 and be able to play all the next levels. An exp of 0 means the level is playable by a pure beginner.

### 4.11.6 fighter-attack

`--fighter-attack=<value>` [Command-line option]
`LW6_FIGHTER_ATTACK` [Environment variable]

`fighter-attack` [XML key]

Type: integer

Default value: 500 Min value: 1 Max value: 10000

Defines how hard fighters will attack others, that is, in one attack, how many life-points the attacked fighter will loose. Increasing this will cause your opponents to melt faster when you attack them. With a low value, it will take ages to take on your opponents. Different styles of game. Can radically change the gameplay.

### 4.11.7 fighter-defense

`--fighter-defense=<value>` [Command-line option]
`LW6_FIGHTER_DEFENSE` [Environment variable]
`fighter-defense` [XML key]

Type: integer

Default value: 50 Min value: 0 Max value: 10000

Defines how fast fighters will regenerate after an attack. When this parameter is set low, an attacked fighter, which is very dark and almost dead will take a very long time to regain energy. If the parameter is set high, it can almost instantaneously regain energy.

### 4.11.8 fighter-new-health

`--fighter-new-health=<value>` [Command-line option]
`LW6_FIGHTER_NEW_HEALTH` [Environment variable]
`fighter-new-health` [XML key]

Type: integer

Default value: 5000 Min value: 1 Max value: 10000

Defines how healthy fighters will be when they appear on the map. This can be either at the beginning of the game of when a fighter changes team. Setting this low will allow battefields to switch from one side to another very fast, for freshly gained fighters will be feeble and very likely to return to their original camp. To calibrate this parameter, keep in mind that the absolute maximum health a fighter can have is always 10000 (ten-thousands).

### 4.11.9 fighter-regenerate

`--fighter-regenerate=<value>` [Command-line option]
`LW6_FIGHTER_REGENERATE` [Environment variable]
`fighter-regenerate` [XML key]

Type: integer

Default value: 5 Min value: 0 Max value: 10000

Defines at which speed fighters will self-regenerate, without even begin packed together. This will allow lone fighters to regenerate a bit by hiding somewhere in the map. This is typically a low value, might even be 0.

### 4.11.10 frags-fade-out

`--frags-fade-out=<value>` [Command-line option]
`LW6_FRAGS_FADE_OUT` [Environment variable]
`frags-fade-out` [XML key]

Type: integer

Default value: 100 Min value: 10 Max value: 100

When a player looses (in deathmatch mode) all player points will be multiplicated by this percentage, for instance if it's 90 and player had 50 points, then player will only have 45 points, then points corresponding to the new death will be added/substrated to its total. This is to avoid players with thousands of points in advance, and keep everyone in the race. A low value will minimize the importance of game start. This is only used in modes where frags are distributed in a proportional way.

### 4.11.11 frags-mode

`--frags-mode=<value>` [Command-line option]
`LW6_FRAGS_MODE` [Environment variable]
`frags-mode` [XML key]

Type: integer

Default value: 2 Min value: 0 Max value: 3

Defines how points are calculated in deathmatch mode, 0 is old school simple mode. 1 is in a mode in which 1 point is attributed to every winner, and looser looses all the corresponding points (total is always 0). 2 isproportional mode, with a total of 0 kept constant, that is, loosers loose as many points as attributed to winners. 3 is a mode in which at each death, winners are attributed a number of points proportional to their fighters, and loosers scores remain untouched.

### 4.11.12 frags-to-distribute

`--frags-to-distribute=<value>` [Command-line option]
`LW6_FRAGS_TO_DISTRIBUTE` [Environment variable]
`frags-to-distribute` [XML key]

Type: integer

Default value: 100 Min value: 10 Max value: 1000

Defines how many points will be distributed when in deathmatch mode. When a player looses, this amont of points will be substracted to its total, and the same amount of points will be distributed to other live players, proportionnally to how many fighters they have on the battlefield.

### 4.11.13 glue-power

`--glue-power=<value>` [Command-line option]
`LW6_GLUE_POWER` [Environment variable]
`glue-power` [XML key]

Type: integer

Default value: 20 Min value: 1 Max value: 100

Defines how sticky and powerfull the glue is. That is, if on 'glue.png' it's pitch black and this parameter is set to 3, then fighters will take 3 steps to do what would normally take only one step.

### 4.11.14 highest-team-color-allowed

`--highest-team-color-allowed=<value>` [Command-line option]
`LW6_HIGHEST_TEAM_COLOR_ALLOWED` [Environment variable]
`highest-team-color-allowed` [XML key]

Type: integer

Default value: 9 Min value: 3 Max value: 9

Id of the greatest/highest color one can use. Normally, you can leave this untouched, the program will automatically fit this according to your exp. Setting an artificially low value will just cause normally available colors to disappear, setting it to a high value does nothing, if you still don't have access to some colors, you still don't, period.

### 4.11.15 highest-weapon-allowed

`--highest-weapon-allowed=<value>` [Command-line option]
`LW6_HIGHEST_WEAPON_ALLOWED` [Environment variable]
`highest-weapon-allowed` [XML key]

Type: integer

Default value: 19 Min value: 7 Max value: 19

Id of the greatest/highest weapon one can use. Normally, you can leave this untouched, the program will automatically fit this according to your exp. Setting an artificially low value will just cause normally available weapons to disappear, setting it to a high value does nothing, if you still don't have access to some weapons, you still don't, period.

### 4.11.16 max-cursor-pot

`--max-cursor-pot=<value>` [Command-line option]
`LW6_MAX_CURSOR_POT` [Environment variable]
`max-cursor-pot` [XML key]

Type: integer

Default value: 1000000 Min value: 50000 Max value: 5000000

Defines the maximum cursor potential. Not really any reason to change it. Any high value should produce the same results. Low values might reveal algorithm bugs and inconsistencies.

### 4.11.17 max-cursor-pot-offset

`--max-cursor-pot-offset=<value>` [Command-line option]
`LW6_MAX_CURSOR_POT_OFFSET` [Environment variable]
`max-cursor-pot-offset` [XML key]

Type: integer

Default value: 100 Min value: 1 Max value: 10000

Defines the maximum cursor potential offset. The idea is that in some cases, the potential of a cursor can increase in burst mode, for instance to make this cursor more important than others, so that fighters rally to it, neglecting other cursors (talking about a multi-cursor controlled team). This parameter is here to limit this burst effect and avoid bugs.

### 4.11.18 max-nb-cursors

`--max-nb-cursors=<value>` [Command-line option]
`LW6_MAX_NB_CURSORS` [Environment variable]
`max-nb-cursors` [XML key]

Type: integer

Default value: 26 Min value: 2 Max value: 26

Defines the maximum number of cursors who can enter the game. Really makes sense in network games. Default value is 26, the maximum.

### 4.11.19 max-nb-nodes

`--max-nb-nodes=<value>` [Command-line option]
`LW6_MAX_NB_NODES` [Environment variable]
`max-nb-nodes` [XML key]

Type: integer

Default value: 12 Min value: 2 Max value: 26

Defines the maximum number of servers who can enter the game. Really makes sense in network games. Default value is 10, and should fit in most cases. Can be raised up to 26.

### 4.11.20 max-nb-teams

`--max-nb-teams=<value>` [Command-line option]
`LW6_MAX_NB_TEAMS` [Environment variable]
`max-nb-teams` [XML key]

Type: integer

Default value: 10 Min value: 2 Max value: 10

Defines the maximum number of teams who can enter the game. Really makes sense in network games. Default value is 10, the maximum.

### 4.11.21 max-round-delta

`--max-round-delta=<value>` [Command-line option]
`LW6_MAX_ROUND_DELTA` [Environment variable]
`max-round-delta` [XML key]

Type: integer

Default value: 1000 Min value: 1 Max value: 10000

This is the companion value of 'round-delta'. Will put an absolute limit to the delta, which (what did you think?) is of course incremented in some cases by the core algorithm. If in doubt, don't touch.

### 4.11.22 max-zone-size

`--max-zone-size=<value>` [Command-line option]
`LW6_MAX_ZONE_SIZE` [Environment variable]
`max-zone-size` [XML key]

Type: integer

Default value: 8 Min value: 1 Max value: 64

Defines the maximum zone size, which is an internal and rather technical parameter. The idea is that to optimize things, Liquid War 6 divides the battlefield in squares, where it can, and tries to make these squares as big as possible, the idea being that everywhere in this square, fighters follow the same intructions. Just a technical optimization. The problem is that setting it too high will reveal the optimization and its tradeoffs to the player, who will see the fighter behave strangely, following invisible paths. Plus, it's ugly. Depending on your tastes (speed, look'n'feel) you'll prefer something nice or something fast. Note that anyways passed a certain value, this does not optimize anything anymore. In doubt, don't touch it.

### 4.11.23 medicine-power

`--medicine-power=<value>` [Command-line option]
`LW6_MEDICINE_POWER` [Environment variable]
`medicine-power` [XML key]

Type: integer

Default value: 100 Min value: 0 Max value: 10000

Defines how fast fighter will automatically regenerate on black zones defined in 'medicine.png'. The value is used to decrease the fighter health at each move, so you should compare its value to something like 'fighter-defense'. Being on a medicined zone is a bit like being defended by an invisible and unknown friend.

### 4.11.24 moves-per-round

`--moves-per-round=<value>` [Command-line option]
`LW6_MOVES_PER_ROUND` [Environment variable]
`moves-per-round` [XML key]

Type: integer

Default value: 2 Min value: 1 Max value: 50

Defines how many times fighters move per round. Increasing this will just make fighters move faster, but won't change anything for the rest, that is keyboard and mouse responsivity, and network traffic will stay the same. Multiplying the number of moves per round by the number of rounds per second will give the number of moves per second, which is, in fact, how fast fighters move on the screen.

### 4.11.25 nb-attack-tries

`--nb-attack-tries=<value>` [Command-line option]
`LW6_NB_ATTACK_TRIES` [Environment variable]

`nb-attack-tries` [XML key]

Type: integer

Default value: 3 Min value: 1 Max value: 7

Defines how many tries a fighter will do before giving-up attacking and choosing another behvior (defense). By tries we mean: how many directions it will try. Going North? Going North-West? Setting this to a low value will make fighters somewhat less aggressive. This idea is that they'll prefer to switch to the next option, that is, defense/regeneration, if there's no opponent right in front of them.

### 4.11.26 nb-defense-tries

`--nb-defense-tries=<value>` [Command-line option]
`LW6_NB_DEFENSE_TRIES` [Environment variable]
`nb-defense-tries` [XML key]

Type: integer

Default value: 1 Min value: 1 Max value: 7

Defines how many tries a fighter will do before giving-up attacking and choosing another behavior (do nothing). By tries we mean: how many directions it will try. Going North? Going North-West? Setting this to a low value, you'll need a very compact pack of fighters for regeneration to operate, else fighters will hang arround unhealthy.

### 4.11.27 nb-move-tries

`--nb-move-tries=<value>` [Command-line option]
`LW6_NB_MOVE_TRIES` [Environment variable]
`nb-move-tries` [XML key]

Type: integer

Default value: 5 Min value: 3 Max value: 7

Defines how many tries a fighter will do before giving-up moving and choosing another behvior (attack or defense). By tries we mean: how many directions it will try. Going North? Going North-West? Setting this to a low value, your fighters will look very stubborn and always try to move in one direction, neglecting the fact that they could dodge. This can lead to queues of fighters and other strange behaviors. On the other hand, setting it too high will cause fighter to always avoid the enemy, and groups of fighters will just pass each other without any fight. Matter of taste.

### 4.11.28 respawn-delay

`--respawn-delay=<value>` [Command-line option]
`LW6_RESPAWN_DELAY` [Environment variable]
`respawn-delay` [XML key]

Type: integer

Default value: 3 Min value: 0 Max value: 30

Delay, in seconds, after which teams reappear on the battlefield, when in deathmatch mode. 0 means team right away.

### 4.11.29 respawn-position-mode

`--respawn-position-mode=<value>` [Command-line option]
`LW6_RESPAWN_POSITION_MODE` [Environment variable]
`respawn-position-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Defines how teams are set up on the map when respawning. 0 means teams respect the pre-defined start positions. 1 means that a random position will be picked, among the existing positions. That is, red could take green's place. 2 means total randomness, teams can appear anywhere.

### 4.11.30 respawn-team

`--respawn-team=<value>` [Command-line option]
`LW6_RESPAWN_TEAM` [Environment variable]
`respawn-team` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 1

Defines what to do when a team dies. If set to 0, team disappears forever, if set to 1, team reappears automatically with fresh fighters. It's a deathmatch mode, where the winner is not the one who stays alive the longest time, since it makes no real sens in this case, but the one who has died less often than others.

### 4.11.31 round-delta

`--round-delta=<value>` [Command-line option]
`LW6_ROUND_DELTA` [Environment variable]
`round-delta` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 100

Conditions by how much the cursor potential will be incremented each time gradient is spreaded. Sounds cryptic? It is. The idea is that at each time you move your cursor of 1 pixel, theorically, you'll need in the worst case to move of 1 more pixel to reach any point on the map. Of course this is not true but this is the default asumption, and gradient spread will fix that. Only in Liquid War 6 this is not even the worst case, for you can control your cursor with the mouse and cross walls. Whenever you cross a wall, you might have done a great distance from the fighters' point of view, if the map is a maze. Thus this parameter, which corrects things, experience shows it does give acceptable results to increase the cursor potential by more than one at each turn. Toy arround with this if you find fighters take wrong paths on some given map. If in doubt, don't touch.

### 4.11.32 rounds-per-sec

`--rounds-per-sec=<value>` [Command-line option]
`LW6_ROUNDS_PER_SEC` [Environment variable]

`rounds-per-sec` [XML key]

Type: integer

Default value: 50 Min value: 1 Max value: 200

Defines the overall speed of the game. All other settings being equal, raising this value will cause the game to behave faster. Everything will be faster, except probably the display since your computer will calculate more game positions in a given time and spend more CPU time. It will also increase network traffic. Values between 10 and 50 really make sense.

### 4.11.33 side-attack-factor

`--side-attack-factor=<value>` [Command-line option]
`LW6_SIDE_ATTACK_FACTOR` [Environment variable]
`side-attack-factor` [XML key]

Type: integer

Default value: 20 Min value: 0 Max value: 100

Defines how hard fighters will attack sideways. It's an algorithm trick, fighters attack by default the opponent right in front, but if there's no fighter there, they will still try to attack someone else, maybe sideways. But doing this their attack is not as strong. This parameter enables you to tune this. This is a percentage.

### 4.11.34 side-defense-factor

`--side-defense-factor=<value>` [Command-line option]
`LW6_SIDE_DEFENSE_FACTOR` [Environment variable]
`side-defense-factor` [XML key]

Type: integer

Default value: 20 Min value: 0 Max value: 100

Defines how fast fighters will regenerate, when being side by side instead of being right in front of the other. This is a percentage.

### 4.11.35 single-army-size

`--single-army-size=<value>` [Command-line option]
`LW6_SINGLE_ARMY_SIZE` [Environment variable]
`single-army-size` [XML key]

Type: integer

Default value: 30 Min value: 1 Max value: 95

Defines the proportion of the whole available space, which will be occupied by an army at the beginning of the game. You can either imagine playing with almost empty maps, or play very crowded with almost no space left. This is a percentage, but will be multiplied by itself to get the actual surface. That is, 50 means 50%*50%, that is, a square of 1/2 the size of a square map, so it represents 25% (1/4) of the total surface.

### 4.11.36 spread-mode

`--spread-mode=<value>` [Command-line option]
`LW6_SPREAD_MODE` [Environment variable]
`spread-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

If set to 1, then gradient spread will be slower but gain in terms of homogeneity and consistency. You could consider setting this to 0 on very very big maps to save CPU cycles, else the default should work fine.

### 4.11.37 spread-thread

`--spread-thread=<value>` [Command-line option]
`LW6_SPREAD_THREAD` [Environment variable]
`spread-thread` [XML key]

Type: integer

Default value: 0 Min value: 0 Max value: 1

If set to 1, the core algorithm with fire a separate thread to spread the gradient. By default this is turned off (set to 0). Consider this as an experimental feature, the program is already rather heavily threaded, turning this on will probably not offer any significant performance gain, even on SMP systems. This might change in the future.

### 4.11.38 spreads-per-round

`--spreads-per-round=<value>` [Command-line option]
`LW6_SPREADS_PER_ROUND` [Environment variable]
`spreads-per-round` [XML key]

Type: integer

Default value: 5 Min value: 1 Max value: 100

Defines how many times the gradient is spread per round. Gradient spread is a very Liquid War 6 specific feature, just remember that the more often you do it, the more accurately fighters will move. That is, you will be sure they really take the shortest path. Usually this does not have much effect, the default value should fit in most cases, but you might want to decrease it on very simple maps where the gradient is obvious, or increase it on complex maps where you want fighters to be real smart.

### 4.11.39 start-blue-x

`--start-blue-x=<value>` [Command-line option]
`LW6_START_BLUE_X` [Environment variable]
`start-blue-x` [XML key]

Type: integer

Default value: 90 Min value: 0 Max value: 100

X start position for the blue team. This is a percentage of map width, value between 0 and 100.

### 4.11.40 start-blue-y

`--start-blue-y=<value>` [Command-line option]
`LW6_START_BLUE_Y` [Environment variable]
`start-blue-y` [XML key]

Type: integer

Default value: 10 Min value: 0 Max value: 100

Y start position for the blue team. This is a percentage of map height, value between 0 and 100.

### 4.11.41 start-cyan-x

`--start-cyan-x=<value>` [Command-line option]
`LW6_START_CYAN_X` [Environment variable]
`start-cyan-x` [XML key]

Type: integer

Default value: 35 Min value: 0 Max value: 100

X start position for the cyan team. This is a percentage of map width, value between 0 and 100.

### 4.11.42 start-cyan-y

`--start-cyan-y=<value>` [Command-line option]
`LW6_START_CYAN_Y` [Environment variable]
`start-cyan-y` [XML key]

Type: integer

Default value: 10 Min value: 0 Max value: 100

Y start position for the cyan team. This is a percentage of map height, value between 0 and 100.

### 4.11.43 start-green-x

`--start-green-x=<value>` [Command-line option]
`LW6_START_GREEN_X` [Environment variable]
`start-green-x` [XML key]

Type: integer

Default value: 90 Min value: 0 Max value: 100

X start position for the green team. This is a percentage of map width, value between 0 and 100.

### 4.11.44 start-green-y

`--start-green-y=<value>` [Command-line option]
`LW6_START_GREEN_Y` [Environment variable]
`start-green-y` [XML key]

Type: integer

Default value: 90 Min value: 0 Max value: 100

Y start position for the green team. This is a percentage of map height, value between 0 and 100.

### 4.11.45 start-lightblue-x

`--start-lightblue-x=<value>` [Command-line option]
`LW6_START_LIGHTBLUE_X` [Environment variable]
`start-lightblue-x` [XML key]

Type: integer

Default value: 35 Min value: 0 Max value: 100

X start position for the lightblue team. This is a percentage of map width, value between 0 and 100.

### 4.11.46 start-lightblue-y

`--start-lightblue-y=<value>` [Command-line option]
`LW6_START_LIGHTBLUE_Y` [Environment variable]
`start-lightblue-y` [XML key]

Type: integer

Default value: 90 Min value: 0 Max value: 100

Y start position for the lightblue team. This is a percentage of map height, value between 0 and 100.

### 4.11.47 start-magenta-x

`--start-magenta-x=<value>` [Command-line option]
`LW6_START_MAGENTA_X` [Environment variable]
`start-magenta-x` [XML key]

Type: integer

Default value: 65 Min value: 0 Max value: 100

X start position for the magenta team. This is a percentage of map width, value between 0 and 100.

### 4.11.48 start-magenta-y

`--start-magenta-y=<value>` [Command-line option]
`LW6_START_MAGENTA_Y` [Environment variable]
`start-magenta-y` [XML key]

Type: integer

Default value: 90 Min value: 0 Max value: 100

Y start position for the magenta team. This is a percentage of map height, value between 0 and 100.

### 4.11.49 start-orange-x

`--start-orange-x=<value>` [Command-line option]
`LW6_START_ORANGE_X` [Environment variable]

`start-orange-x` [XML key]

Type: integer

Default value: 65 Min value: 0 Max value: 100

X start position for the orange team. This is a percentage of map width, value between 0 and 100.

### 4.11.50 start-orange-y

`--start-orange-y=<value>` [Command-line option]
`LW6_START_ORANGE_Y` [Environment variable]
`start-orange-y` [XML key]

Type: integer

Default value: 10 Min value: 0 Max value: 100

Y start position for the orange team. This is a percentage of map height, value between 0 and 100.

### 4.11.51 start-pink-x

`--start-pink-x=<value>` [Command-line option]
`LW6_START_PINK_X` [Environment variable]
`start-pink-x` [XML key]

Type: integer

Default value: 10 Min value: 0 Max value: 100

X start position for the pink team. This is a percentage of map width, value between 0 and 100.

### 4.11.52 start-pink-y

`--start-pink-y=<value>` [Command-line option]
`LW6_START_PINK_Y` [Environment variable]
`start-pink-y` [XML key]

Type: integer

Default value: 50 Min value: 0 Max value: 100

Y start position for the pink team. This is a percentage of map height, value between 0 and 100.

### 4.11.53 start-position-mode

`--start-position-mode=<value>` [Command-line option]
`LW6_START_POSITION_MODE` [Environment variable]
`start-position-mode` [XML key]

Type: integer

Default value: 0 Min value: 0 Max value: 2

Defines how teams are set up on the map at game startup. 0 means teams respect the pre-defined start positions. 1 means that a random position will be picked, among the existing positions. That is, red could take green's place. 2 means total randomness, teams can appear anywhere.

### 4.11.54 start-purple-x

`--start-purple-x=<value>` [Command-line option]
`LW6_START_PURPLE_X` [Environment variable]
`start-purple-x` [XML key]

Type: integer

Default value: 90 Min value: 0 Max value: 100

X start position for the purple team. This is a percentage of map width, value between 0 and 100.

### 4.11.55 start-purple-y

`--start-purple-y=<value>` [Command-line option]
`LW6_START_PURPLE_Y` [Environment variable]
`start-purple-y` [XML key]

Type: integer

Default value: 50 Min value: 0 Max value: 100

Y start position for the purple team. This is a percentage of map height, value between 0 and 100.

### 4.11.56 start-red-x

`--start-red-x=<value>` [Command-line option]
`LW6_START_RED_X` [Environment variable]
`start-red-x` [XML key]

Type: integer

Default value: 10 Min value: 0 Max value: 100

X start position for the red team. This is a percentage of map width, value between 0 and 100.

### 4.11.57 start-red-y

`--start-red-y=<value>` [Command-line option]
`LW6_START_RED_Y` [Environment variable]
`start-red-y` [XML key]

Type: integer

Default value: 10 Min value: 0 Max value: 100

Y start position for the red team. This is a percentage of map height, value between 0 and 100.

### 4.11.58 start-yellow-x

`--start-yellow-x=<value>` [Command-line option]
`LW6_START_YELLOW_X` [Environment variable]
`start-yellow-x` [XML key]

Type: integer

Default value: 10 Min value: 0 Max value: 100

X start position for the yellow team. This is a percentage of map width, value between 0 and 100.

### 4.11.59 start-yellow-y

`--start-yellow-y=<value>` [Command-line option]
`LW6_START_YELLOW_Y` [Environment variable]
`start-yellow-y` [XML key]

Type: integer

Default value: 90 Min value: 0 Max value: 100

Y start position for the yellow team. This is a percentage of map height, value between 0 and 100.

### 4.11.60 team-profile-blue-aggressive

`--team-profile-blue-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_BLUE_AGGRESSIVE` [Environment variable]
`team-profile-blue-aggressive` [XML key]

Type: integer

Default value: 150 Min value: 5 Max value: 2000

Defines how aggressive the blue team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.61 team-profile-blue-fast

`--team-profile-blue-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_BLUE_FAST` [Environment variable]
`team-profile-blue-fast` [XML key]

Type: integer

Default value: 50 Min value: 5 Max value: 2000

Changes the speed of the blue team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.62 team-profile-blue-mobile

`--team-profile-blue-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_BLUE_MOBILE` [Environment variable]
`team-profile-blue-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the blue team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.63 team-profile-blue-vulnerable

`--team-profile-blue-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_BLUE_VULNERABLE` [Environment variable]
`team-profile-blue-vulnerable` [XML key]

Type: integer

Default value: 60 Min value: 5 Max value: 2000

Defines how vulnerable the blue team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.64 team-profile-blue-weapon-alternate-id

`--team-profile-blue-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_BLUE_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-blue-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_CONTROL Min value: 0 Max value: 19

Id of the default alternate weapon for the blue team, see the documentation about weapons to know what these ids mean.

### 4.11.65 team-profile-blue-weapon-id

`--team-profile-blue-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_BLUE_WEAPON_ID` [Environment variable]
`team-profile-blue-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_REWIND Min value: 0 Max value: 19

Id of the default weapon for the blue team, see the documentation about weapons to know what these ids mean.

### 4.11.66 team-profile-blue-weapon-mode

`--team-profile-blue-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_BLUE_WEAPON_MODE` [Environment variable]
`team-profile-blue-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for blue team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.67 team-profile-cyan-aggressive

`--team-profile-cyan-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_CYAN_AGGRESSIVE` [Environment variable]
`team-profile-cyan-aggressive` [XML key]

Type: integer

Default value: 44 Min value: 5 Max value: 2000

Defines how aggressive the cyan team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.68 team-profile-cyan-fast

`--team-profile-cyan-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_CYAN_FAST` [Environment variable]
`team-profile-cyan-fast` [XML key]

Type: integer

Default value: 40 Min value: 5 Max value: 2000

Changes the speed of the cyan team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.69 team-profile-cyan-mobile

`--team-profile-cyan-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_CYAN_MOBILE` [Environment variable]
`team-profile-cyan-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the cyan team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.70 team-profile-cyan-vulnerable

`--team-profile-cyan-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_CYAN_VULNERABLE` [Environment variable]
`team-profile-cyan-vulnerable` [XML key]

Type: integer

Default value: 12 Min value: 5 Max value: 2000

Defines how vulnerable the cyan team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.71 team-profile-cyan-weapon-alternate-id

`--team-profile-cyan-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_CYAN_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-cyan-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_REVERSE Min value: 0 Max value: 19

Id of the default alternate weapon for the cyan team, see the documentation about weapons to know what these ids mean.

### 4.11.72 team-profile-cyan-weapon-id

`--team-profile-cyan-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_CYAN_WEAPON_ID` [Environment variable]
`team-profile-cyan-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_TURBO Min value: 0 Max value: 19

Id of the default weapon for the cyan team, see the documentation about weapons to know what these ids mean.

### 4.11.73 team-profile-cyan-weapon-mode

`--team-profile-cyan-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_CYAN_WEAPON_MODE` [Environment variable]
`team-profile-cyan-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for cyan team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.74 team-profile-green-aggressive

`--team-profile-green-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_GREEN_AGGRESSIVE` [Environment variable]
`team-profile-green-aggressive` [XML key]

Type: integer

Default value: 70 Min value: 5 Max value: 2000

Defines how aggressive the green team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.75 team-profile-green-fast

`--team-profile-green-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_GREEN_FAST` [Environment variable]
`team-profile-green-fast` [XML key]

Type: integer

Default value: 70 Min value: 5 Max value: 2000

Changes the speed of the green team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.76 team-profile-green-mobile

`--team-profile-green-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_GREEN_MOBILE` [Environment variable]

`team-profile-green-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the green team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.77 team-profile-green-vulnerable

`--team-profile-green-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_GREEN_VULNERABLE` [Environment variable]
`team-profile-green-vulnerable` [XML key]

Type: integer

Default value: 30 Min value: 5 Max value: 2000

Defines how vulnerable the green team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.78 team-profile-green-weapon-alternate-id

`--team-profile-green-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_GREEN_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-green-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_MIX Min value: 0 Max value: 19

Id of the default alternate weapon for the green team, see the documentation about weapons to know what these ids mean.

### 4.11.79 team-profile-green-weapon-id

`--team-profile-green-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_GREEN_WEAPON_ID` [Environment variable]
`team-profile-green-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_CRAZY Min value: 0 Max value: 19

Id of the default weapon for the green team, see the documentation about weapons to know what these ids mean.

### 4.11.80 team-profile-green-weapon-mode

`--team-profile-green-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_GREEN_WEAPON_MODE` [Environment variable]
`team-profile-green-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for green team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.81 team-profile-lightblue-aggressive

`--team-profile-lightblue-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_LIGHTBLUE_AGGRESSIVE` [Environment variable]
`team-profile-lightblue-aggressive` [XML key]

Type: integer

Default value: 200 Min value: 5 Max value: 2000

Defines how aggressive the lightblue team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.82 team-profile-lightblue-fast

`--team-profile-lightblue-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_LIGHTBLUE_FAST` [Environment variable]
`team-profile-lightblue-fast` [XML key]

Type: integer

Default value: 20 Min value: 5 Max value: 2000

Changes the speed of the lightblue team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.83 team-profile-lightblue-mobile

`--team-profile-lightblue-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_LIGHTBLUE_MOBILE` [Environment variable]
`team-profile-lightblue-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the lightblue team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.84 team-profile-lightblue-vulnerable

`--team-profile-lightblue-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_LIGHTBLUE_VULNERABLE` [Environment variable]
`team-profile-lightblue-vulnerable` [XML key]

Type: integer

Default value: 8 Min value: 5 Max value: 2000

Defines how vulnerable the lightblue team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.85 team-profile-lightblue-weapon-alternate-id

`--team-profile-lightblue-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_LIGHTBLUE_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-lightblue-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_KAMIKAZE Min value: 0 Max value: 19

Id of the default alternate weapon for the lightblue team, see the documentation about weapons to know what these ids mean.

### 4.11.86 team-profile-lightblue-weapon-id

`--team-profile-lightblue-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_LIGHTBLUE_WEAPON_ID` [Environment variable]
`team-profile-lightblue-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_TELEPORT Min value: 0 Max value: 19

Id of the default weapon for the lightblue team, see the documentation about weapons to know what these ids mean.

### 4.11.87 team-profile-lightblue-weapon-mode

`--team-profile-lightblue-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_LIGHTBLUE_WEAPON_MODE` [Environment variable]
`team-profile-lightblue-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for lightblue team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.88 team-profile-magenta-aggressive

`--team-profile-magenta-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_MAGENTA_AGGRESSIVE` [Environment variable]
`team-profile-magenta-aggressive` [XML key]

Type: integer

Default value: 192 Min value: 5 Max value: 2000

Defines how aggressive the magenta team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.89 team-profile-magenta-fast

`--team-profile-magenta-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_MAGENTA_FAST` [Environment variable]
`team-profile-magenta-fast` [XML key]

Type: integer

Default value: 320 Min value: 5 Max value: 2000

Changes the speed of the magenta team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.90 team-profile-magenta-mobile

`--team-profile-magenta-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_MAGENTA_MOBILE` [Environment variable]
`team-profile-magenta-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the magenta team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.91 team-profile-magenta-vulnerable

`--team-profile-magenta-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_MAGENTA_VULNERABLE` [Environment variable]
`team-profile-magenta-vulnerable` [XML key]

Type: integer

Default value: 1920 Min value: 5 Max value: 2000

Defines how vulnerable the magenta team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.92 team-profile-magenta-weapon-alternate-id

`--team-profile-magenta-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_MAGENTA_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-magenta-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_ATTRACT Min value: 0 Max value: 19

Id of the default alternate weapon for the magenta team, see the documentation about weapons to know what these ids mean.

### 4.11.93 team-profile-magenta-weapon-id

`--team-profile-magenta-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_MAGENTA_WEAPON_ID` [Environment variable]
`team-profile-magenta-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_FIX Min value: 0 Max value: 19

Id of the default weapon for the magenta team, see the documentation about weapons to know what these ids mean.

### 4.11.94 team-profile-magenta-weapon-mode

`--team-profile-magenta-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_MAGENTA_WEAPON_MODE` [Environment variable]
`team-profile-magenta-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for magenta team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.95 team-profile-orange-aggressive

`--team-profile-orange-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_ORANGE_AGGRESSIVE` [Environment variable]
`team-profile-orange-aggressive` [XML key]

Type: integer

Default value: 48 Min value: 5 Max value: 2000

Defines how aggressive the orange team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.96 team-profile-orange-fast

`--team-profile-orange-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_ORANGE_FAST` [Environment variable]
`team-profile-orange-fast` [XML key]

Type: integer

Default value: 160 Min value: 5 Max value: 2000

Changes the speed of the orange team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.97 team-profile-orange-mobile

`--team-profile-orange-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_ORANGE_MOBILE` [Environment variable]
`team-profile-orange-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the orange team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.98 team-profile-orange-vulnerable

`--team-profile-orange-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_ORANGE_VULNERABLE` [Environment variable]
`team-profile-orange-vulnerable` [XML key]

Type: integer

Default value: 144 Min value: 5 Max value: 2000

Defines how vulnerable the orange team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.99 team-profile-orange-weapon-alternate-id

`--team-profile-orange-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_ORANGE_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-orange-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_SHRINK Min value: 0 Max value: 19

Id of the default alternate weapon for the orange team, see the documentation about weapons to know what these ids mean.

### 4.11.100 team-profile-orange-weapon-id

`--team-profile-orange-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_ORANGE_WEAPON_ID` [Environment variable]
`team-profile-orange-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_BERZERK Min value: 0 Max value: 19

Id of the default weapon for the orange team, see the documentation about weapons to know what these ids mean.

### 4.11.101 team-profile-orange-weapon-mode

`--team-profile-orange-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_ORANGE_WEAPON_MODE` [Environment variable]
`team-profile-orange-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for orange team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.102 team-profile-pink-aggressive

`--team-profile-pink-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PINK_AGGRESSIVE` [Environment variable]
`team-profile-pink-aggressive` [XML key]

Type: integer

Default value: 640 Min value: 5 Max value: 2000

Defines how aggressive the pink team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.103 team-profile-pink-fast

`--team-profile-pink-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PINK_FAST` [Environment variable]
`team-profile-pink-fast` [XML key]

Type: integer

Default value: 80 Min value: 5 Max value: 2000

Changes the speed of the pink team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.104 team-profile-pink-mobile

`--team-profile-pink-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PINK_MOBILE` [Environment variable]
`team-profile-pink-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the pink team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.105 team-profile-pink-vulnerable

`--team-profile-pink-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PINK_VULNERABLE` [Environment variable]
`team-profile-pink-vulnerable` [XML key]

Type: integer

Default value: 640 Min value: 5 Max value: 2000

Defines how vulnerable the pink team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.106 team-profile-pink-weapon-alternate-id

`--team-profile-pink-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PINK_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-pink-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_PLAGUE Min value: 0 Max value: 19

Id of the default alternate weapon for the pink team, see the documentation about weapons to know what these ids mean.

### 4.11.107 team-profile-pink-weapon-id

`--team-profile-pink-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PINK_WEAPON_ID` [Environment variable]
`team-profile-pink-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_INVINCIBLE Min value: 0 Max value: 19

Id of the default weapon for the pink team, see the documentation about weapons to know what these ids mean.

### 4.11.108 team-profile-pink-weapon-mode

`--team-profile-pink-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PINK_WEAPON_MODE` [Environment variable]
`team-profile-pink-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for pink team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.109 team-profile-purple-aggressive

`--team-profile-purple-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PURPLE_AGGRESSIVE` [Environment variable]
`team-profile-purple-aggressive` [XML key]

Type: integer

Default value: 32 Min value: 5 Max value: 2000

Defines how aggressive the purple team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.110 team-profile-purple-fast

`--team-profile-purple-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PURPLE_FAST` [Environment variable]
`team-profile-purple-fast` [XML key]

Type: integer

Default value: 80 Min value: 5 Max value: 2000

Changes the speed of the purple team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.111 team-profile-purple-mobile

`--team-profile-purple-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PURPLE_MOBILE` [Environment variable]

`team-profile-purple-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the purple team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.112 team-profile-purple-vulnerable

`--team-profile-purple-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PURPLE_VULNERABLE` [Environment variable]
`team-profile-purple-vulnerable` [XML key]

Type: integer

Default value: 16 Min value: 5 Max value: 2000

Defines how vulnerable the purple team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.113 team-profile-purple-weapon-alternate-id

`--team-profile-purple-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PURPLE_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-purple-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_DISAPPEAR Min value: 0 Max value: 19

Id of the default alternate weapon for the purple team, see the documentation about weapons to know what these ids mean.

### 4.11.114 team-profile-purple-weapon-id

`--team-profile-purple-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PURPLE_WEAPON_ID` [Environment variable]
`team-profile-purple-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_ATOMIC Min value: 0 Max value: 19

Id of the default weapon for the purple team, see the documentation about weapons to know what these ids mean.

### 4.11.115 team-profile-purple-weapon-mode

`--team-profile-purple-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_PURPLE_WEAPON_MODE` [Environment variable]
`team-profile-purple-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for purple team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.116 team-profile-red-aggressive

`--team-profile-red-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_RED_AGGRESSIVE` [Environment variable]
`team-profile-red-aggressive` [XML key]

Type: integer

Default value: 220 Min value: 5 Max value: 2000

Defines how aggressive the red team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.117 team-profile-red-fast

`--team-profile-red-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_RED_FAST` [Environment variable]
`team-profile-red-fast` [XML key]

Type: integer

Default value: 160 Min value: 5 Max value: 2000

Changes the speed of the red team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.118 team-profile-red-mobile

`--team-profile-red-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_RED_MOBILE` [Environment variable]
`team-profile-red-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the red team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.119 team-profile-red-vulnerable

`--team-profile-red-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_RED_VULNERABLE` [Environment variable]
`team-profile-red-vulnerable` [XML key]

Type: integer

Default value: 110 Min value: 5 Max value: 2000

Defines how vulnerable the red team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.120 team-profile-red-weapon-alternate-id

`--team-profile-red-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_RED_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-red-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_ESCAPE Min value: 0 Max value: 19

Id of the default alternate weapon for the red team, see the documentation about weapons to know what these ids mean.

### 4.11.121 team-profile-red-weapon-id

`--team-profile-red-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_RED_WEAPON_ID` [Environment variable]
`team-profile-red-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_STEAL Min value: 0 Max value: 19

Id of the default weapon for the red team, see the documentation about weapons to know what these ids mean.

### 4.11.122 team-profile-red-weapon-mode

`--team-profile-red-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_RED_WEAPON_MODE` [Environment variable]
`team-profile-red-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for red team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.123 team-profile-yellow-aggressive

`--team-profile-yellow-aggressive=<value>` [Command-line option]
`LW6_TEAM_PROFILE_YELLOW_AGGRESSIVE` [Environment variable]
`team-profile-yellow-aggressive` [XML key]

Type: integer

Default value: 200 Min value: 5 Max value: 2000

Defines how aggressive the yellow team is. This is a percentage, if set to 200 then team will attack twice as much as any other team with the default value. Setting this to a high value clearly advantages this team.

### 4.11.124 team-profile-yellow-fast

`--team-profile-yellow-fast=<value>` [Command-line option]
`LW6_TEAM_PROFILE_YELLOW_FAST` [Environment variable]
`team-profile-yellow-fast` [XML key]

Type: integer

Default value: 70 Min value: 5 Max value: 2000

Changes the speed of the yellow team. This is a percentage, if set to 50, then team will move twice slower than other teams with the default parameter. Setting this high is very likely to advantage the team.

### 4.11.125 team-profile-yellow-mobile

`--team-profile-yellow-mobile=<value>` [Command-line option]
`LW6_TEAM_PROFILE_YELLOW_MOBILE` [Environment variable]
`team-profile-yellow-mobile` [XML key]

Type: integer

Default value: 0 Min value: -3 Max value: 3

Increases (or decreases if negative) the number of move/attack/defense tries for the yellow team. If set to a high value team will appear more mobile and do more things, but it won't change its cruising speed. It's not obvious to tell wether this is an advantage or not, but it clearly changes the behavior.

### 4.11.126 team-profile-yellow-vulnerable

`--team-profile-yellow-vulnerable=<value>` [Command-line option]
`LW6_TEAM_PROFILE_YELLOW_VULNERABLE` [Environment variable]
`team-profile-yellow-vulnerable` [XML key]

Type: integer

Default value: 90 Min value: 5 Max value: 2000

Defines how vulnerable the yellow team is. This is a percentage, if set to 200 then team will be attacked twice as much as any other team with the default value. Setting this to a high value clearly disadvantages this team.

### 4.11.127 team-profile-yellow-weapon-alternate-id

`--team-profile-yellow-weapon-alternate-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_YELLOW_WEAPON_ALTERNATE_ID` [Environment variable]
`team-profile-yellow-weapon-alternate-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_PERMUTATION Min value: 0 Max value: 19

Id of the default alternate weapon for the yellow team, see the documentation about weapons to know what these ids mean.

### 4.11.128 team-profile-yellow-weapon-id

`--team-profile-yellow-weapon-id=<value>` [Command-line option]
`LW6_TEAM_PROFILE_YELLOW_WEAPON_ID` [Environment variable]
`team-profile-yellow-weapon-id` [XML key]

Type: integer

Default value: LW6MAP_WEAPON_SCATTER Min value: 0 Max value: 19

Id of the default weapon for the yellow team, see the documentation about weapons to know what these ids mean.

### 4.11.129 team-profile-yellow-weapon-mode

`--team-profile-yellow-weapon-mode=<value>` [Command-line option]
`LW6_TEAM_PROFILE_YELLOW_WEAPON_MODE` [Environment variable]
`team-profile-yellow-weapon-mode` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 2

Weapon mode for yellow team. 0 means there's no weapon, 1 means one weapon per team, defined by the weapon-id parameter, 2 means random weapon.

### 4.11.130 total-armies-size

`--total-armies-size=<value>` [Command-line option]
`LW6_TOTAL_ARMIES_SIZE` [Environment variable]
`total-armies-size` [XML key]

Type: integer

Default value: 60 Min value: 1 Max value: 95

Defines the proportion of the whole available space, which can be occupied by all the armies present together. Setting this low, whenever a new team arrives on the map, fighters might be stolen to other teams, otherwise the ame would get too crowded. This allows you to play with reasonnably enough fighters with 2 players, while still allowing interesting gameplay with many players. This is a percentage, but will be multiplied by itself to get the actual surface. That is, 50 means 50%*50%, that is, a square of 1/2 the size of a square map, so it represents 25% (1/4) of the total surface.

### 4.11.131 total-time

`--total-time=<value>` [Command-line option]
`LW6_TOTAL_TIME` [Environment variable]
`total-time` [XML key]

Type: integer

Default value: 900 Min value: 10 Max value: 864000

Defines the maximum time of the game, in seconds. Note that in some cases, the game can end much earlier if some player has managed to win before the bell rings. Also, technically, this value will be translated into rounds and moves, and the game engine will wait until enough rounds and moves have been played. So if the computer is too slow and the desired speed is not reached, then the game will last for a longer time.

### 4.11.132 use-team-profiles

`--use-team-profiles=<value>` [Command-line option]
`LW6_USE_TEAM_PROFILES` [Environment variable]
`use-team-profiles` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 1

If set, then all the team-profile-... values will be taken in account. This enables a mode in which teams behave differently according to their colors. If you disable this, then all teams will behave the same, which is more fair, but might not be as fun.

### 4.11.133 vertical-move

`--vertical-move=<value>` [Command-line option]
`LW6_VERTICAL_MOVE` [Environment variable]
`vertical-move` [XML key]

Type: integer

Default value: 1 Min value: 0 Max value: 7

Defines when to process a vertical move (along the Z 'depth' axis). If set to 0, fighters never spontaneously move along this axis. If set to 1, it will be tried just after the first move failed. If set to 2, it will be tried just after the second move failed. And so on.

### 4.11.134 weapon-charge-delay

`--weapon-charge-delay=<value>` [Command-line option]
`LW6_WEAPON_CHARGE_DELAY` [Environment variable]
`weapon-charge-delay` [XML key]

Type: integer

Default value: 30 Min value: 1 Max value: 600

How long it will take for weapons to charge and be usable, by default. Unit is seconds.

### 4.11.135 weapon-charge-max

`--weapon-charge-max=<value>` [Command-line option]
`LW6_WEAPON_CHARGE_MAX` [Environment variable]
`weapon-charge-max` [XML key]

Type: integer

Default value: 200 Min value: 100 Max value: 1000

Maximum (percentage) of charge intensity that one have. For instance, if this is 400, then if you wait four times more than required before firing, then you weapon will have four times its default power, but if you wait five times more it will still be four times more powerfull, it's just the limit after which it's useless to charge.

### 4.11.136 weapon-duration

`--weapon-duration=<value>` [Command-line option]
`LW6_WEAPON_DURATION` [Environment variable]
`weapon-duration` [XML key]

Type: integer

Default value: 3 Min value: 1 Max value: 60

How long all weapons (for which duration makes sense) will last. Unit is seconds.

### 4.11.137 weapon-tune-berzerk-power

`--weapon-tune-berzerk-power=<value>` [Command-line option]
`LW6_WEAPON_TUNE_BERZERK_POWER` [Environment variable]
`weapon-tune-berzerk-power` [XML key]

Type: integer

Default value: 3 Min value: 1 Max value: 100

Use to specifiy how strong berzerk mode is, if set to 3, then attacks will be 3 times as efficient in berzerk mode.

### 4.11.138 weapon-tune-turbo-power

`--weapon-tune-turbo-power=<value>` [Command-line option]
`LW6_WEAPON_TUNE_TURBO_POWER` [Environment variable]
`weapon-tune-turbo-power` [XML key]

Type: integer

Default value: 3 Min value: 1 Max value: 10

Defines how fast fighters move in turbo mode, if set to 3, then fighters move and act 3 times as fast.

### 4.11.139 x-polarity

`--x-polarity=<value>` [Command-line option]
`LW6_X_POLARITY` [Environment variable]
`x-polarity` [XML key]

Type: integer

Default value: 0 Min value: -1 Max value: 1

Defines how the map will be wrapped on the X (horizontal) axis. If set to 0, nothing is wrapped. If set to 1, the right and left borders are connected, any fighter can disappear on the right border and reappear on the left border, for instance. If set to -1, it will be wrapped but also inversed, that is on a 320x240 map, a fighter disappearing on the left border at position (0,60) will reapper on the right border at position (319,180). You can combine it with 'y-polarity'.

### 4.11.140 y-polarity

`--y-polarity=<value>` [Command-line option]
`LW6_Y_POLARITY` [Environment variable]
`y-polarity` [XML key]

Type: integer

Default value: 0 Min value: -1 Max value: 1

Defines how the map will be wrapped on the Y (vertical) axis. If set to 0, nothing is wrapped. If set to 1, the top and bottom borders are connected, any fighter can disappear on the top border and reappear on the bottom border, for instance. If set to -1, it will be wrapped but also inversed, that is on a 320x240 map, a fighter disappearing on the bottom border at position (40,239) will reapper on the top border at position (280,0). You can combine it with 'x-polarity'.

### 4.11.141 z-polarity

`--z-polarity=<value>` [Command-line option]
`LW6_Z_POLARITY` [Environment variable]
`z-polarity` [XML key]

Type: integer

Default value: 0 Min value: 0 Max value: 1

Defines how the map will be wrapped on the Z (deep) axis. If set to 0, nothing is wrapped. If set to 1, when using a 4 layer map, for instance, fighters on layer 1 will be able to go directly to layer 4 even if layers 2 and 3 are filled with walls. A value of -1 is forbidden, this is not like x and y axis, it does not really make sense. Consider this an advanced setting which might save a layer in some tricky cases, the default value of 0 should fit in most cases.

## 4.12 Map hints.xml

### 4.12.1 background-color-auto

`--background-color-auto=<value>` [Command-line option]
`LW6_BACKGROUND_COLOR_AUTO` [Environment variable]
`background-color-auto` [XML key]

Type: boolean

Default value: true

Defines wether hud colors will be set automatically from base and alternate colors. This is a time saver to keep map designers from requiring to redefined every single color in the game. You only need to set color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg. Then hud_color_frame_bg, hud_color_frame_fg, hud_color_text_bg and hud_color_text_fg will be automatically set.

### 4.12.2 downsize-using-bench-value

`--downsize-using-bench-value=<value>` [Command-line option]
`LW6_DOWNSIZE_USING_BENCH_VALUE` [Environment variable]
`downsize-using-bench-value` [XML key]

Type: boolean

Default value: true

If set, then the game will automatically downsize a map according to the 'bench-value' parameter. Downsizing means: a 1600x1200 maps becomes 200x150, for instance. Downsizing causes fighters to be bigger because map resolution is lower. This will avoid running the game on a too big map, with your computer not being able to handle it at the required speed.

### 4.12.3 downsize-using-fighter-scale

`--downsize-using-fighter-scale=<value>` [Command-line option]
`LW6_DOWNSIZE_USING_FIGHTER_SCALE` [Environment variable]

`downsize-using-fighter-scale` [XML key]

Type: boolean

Default value: false

If set, then the game will automatically downsize a map according to the 'fighter-scale' parameter. Downsizing means: a 1600x1200 maps becomes 200x150, for instance. Downsizing causes fighters to be bigger because map resolution is lower. This can be usefull if you don't want fighters to be too small.

### 4.12.4 fighter-scale

`--fighter-scale=<value>` [Command-line option]
`LW6_FIGHTER_SCALE` [Environment variable]
`fighter-scale` [XML key]

Type: float

Default value: 1.0

Defines how wide (in pixels) fighters must be. This parameter is very important and will largely condition the number of fighters on the map. It is used when loading the map. If it is, for instance, set to 1, there will be exactly a fighter per pixel on the screen. That is, if you play 640x480 on an empty map, the maximum fighters you could have is about 300000. The idea is that by changing the resolution, you also define the density of the map. In pratice, this is done in the hope that someone with a slow computer will pick up a low resolution and therefore play small levels. Conversely, someone with a brand new computer with powerfull CPU & GPU will use great resolutions and be happy with many fighters on the map. Still, changing the resolution after loading the map will not affet the number of fighters. Same for network games, the first player, who loads the map, defines its properties according to its own settings.

### 4.12.5 guess-colors

`--guess-colors=<value>` [Command-line option]
`LW6_GUESS_COLORS` [Environment variable]
`guess-colors` [XML key]

Type: boolean

Default value: true

Defines wether colors should be set automatically from texture colors. If set to true, then the program will try to pick up colors automatically from the texture, and will override the values of the color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg parameters. How these colors are picked up can't be garanteed, so if the map does not have strong contrast or if there can be any form of ambiguity, it's safe to set this to false and define one's own colors.

### 4.12.6 guess-moves-per-sec

`--guess-moves-per-sec=<value>` [Command-line option]
`LW6_GUESS_MOVES_PER_SEC` [Environment variable]

`guess-moves-per-sec` [XML key]

Type: boolean

Default value: true

If set, then loader will use 'time-to-cross-level' to guess the game speed parameters.

### 4.12.7 hud-color-auto

`--hud-color-auto=<value>` [Command-line option]
`LW6_HUD_COLOR_AUTO` [Environment variable]
`hud-color-auto` [XML key]

Type: boolean

Default value: true

Defines wether hud colors will be set automatically from base and alternate colors. This is a time saver to keep map designers from requiring to redefined every single color in the game. You only need to set color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg. Then hud_color_frame_bg, hud_color_frame_fg, hud_color_text_bg and hud_color_text_fg will be automatically set.

### 4.12.8 max-map-height

`--max-map-height=<value>` [Command-line option]
`LW6_MAX_MAP_HEIGHT` [Environment variable]
`max-map-height` [XML key]

Type: integer

Default value: 1000

Allows you to give a maximum map height. When designing a map you might wonder: this is dumb I'm conceiving this map I know its height, why should I limit it? Now think of the play who plays on a old slowish computer with a tiny screen. He might redefine this himself, and does not necessarly wishes to fire Gimp to rescale the map.

### 4.12.9 max-map-surface

`--max-map-surface=<value>` [Command-line option]
`LW6_MAX_MAP_SURFACE` [Environment variable]
`max-map-surface` [XML key]

Type: integer

Default value: 1000000

Allows you to give a maximum map surface. Map surface is simply (width * height). This parameter is just here to save you the hassle of defining both 'max-map-width' and 'max-map-height' in a consistent manner.

### 4.12.10 max-map-width

`--max-map-width=<value>` [Command-line option]
`LW6_MAX_MAP_WIDTH` [Environment variable]
`max-map-width` [XML key]

Type: integer

Default value: 1500

Allows you to give a maximum map width. When designing a map you might wonder: this is dumb I'm conceiving this map I know its width, why should I limit it? Now think of the play who plays on a old slowish computer with a tiny screen. He might redefine this himself, and does not necessarly wishes to fire Gimp to rescale the map.

### 4.12.11 menu-color-auto

`--menu-color-auto=<value>` [Command-line option]
`LW6_MENU_COLOR_AUTO` [Environment variable]
`menu-color-auto` [XML key]

Type: boolean

Default value: true

Defines wether menu colors will be set automatically from base and alternate colors. This is a time saver to keep map designers from requiring to redefined every single color in the game. You only need to set color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg. Then menu_color_default_bg, menu_color_default_fg, menu_color_selected_bg, menu_color_selected_fg, menu_color_disabled_bg and menu_color_disabled_fg will be automatically set.

### 4.12.12 min-map-height

`--min-map-height=<value>` [Command-line option]
`LW6_MIN_MAP_HEIGHT` [Environment variable]
`min-map-height` [XML key]

Type: integer

Default value: 30

Allows you to give a minimum map height. When designing a map you might wonder: this is dumb I'm conceiving this map I know its height, why should I limit it? Now think of the player who decided to play with highly-defined maps because he has a super calculator and a hudge screen. He might redefine this himself, and does not necessarly wishes to fire Gimp to rescale the map.

### 4.12.13 min-map-surface

`--min-map-surface=<value>` [Command-line option]
`LW6_MIN_MAP_SURFACE` [Environment variable]
`min-map-surface` [XML key]

Type: integer

Default value: 3600

Allows you to give a minimum map surface. Map surface is simply (width * height). This parameter is just here to save you the hassle of defining both 'min-map-width' and 'min-map-height' in a consistent manner.

### 4.12.14 min-map-width

`--min-map-width=<value>` [Command-line option]

`LW6_MIN_MAP_WIDTH` [Environment variable]
`min-map-width` [XML key]

Type: integer

Default value: 40

Allows you to give a minimum map width. When designing a map you might wonder: this is dumb I'm conceiving this map I know its width, why should I limit it? Now think of the player who decided to play with highly-defined maps because he has a super calculator and a hudge screen. He might redefine this himself, and does not necessarly wishes to fire Gimp to rescale the map.

### 4.12.15 resample

`--resample=<value>` [Command-line option]
`LW6_RESAMPLE` [Environment variable]
`resample` [XML key]

Type: boolean

Default value: true

If set to true, maps will always be resampled to a size which depends on your screen resolution, zoom factor, and the rest. If false, maps will be set at the exact resolution of map.png.

### 4.12.16 speed

`--speed=<value>` [Command-line option]
`LW6_SPEED` [Environment variable]
`speed` [XML key]

Type: float

Default value: 1.0

This parameter is the main parameter on which game speed depends. The map loader will garantee, by downscaling the map, that to cross the level (by crossing the level we mean, for instance, going from top-left corner to bottom-right corner in a straight line) a fighter will take a constant amount of time. Under the hood, the loader might of course rescale the map but it will also change game speed so that, at the end, fighters take a constant time to cross the level. This is, indeed, the most important thing, players do not care much if internally there are X or Y moves per second, the global game experience depends on how fast fighter movement looks on the screen. The default settings corresponds roughly to one second to cross the level. If you set this to 2.0, it will go twice faster.

### 4.12.17 system-color-auto

`--system-color-auto=<value>` [Command-line option]
`LW6_SYSTEM_COLOR_AUTO` [Environment variable]
`system-color-auto` [XML key]

Type: boolean

Default value: true

Defines wether system colors will be set automatically from base and alternate colors. This is a time saver to keep map designers from requiring to redefined every single color in the game. You only need to set color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg. Then system_color_bg and system_color_fg will be automatically set.

### 4.12.18 upsize-using-bench-value

`--upsize-using-bench-value=<value>` [Command-line option]
`LW6_UPSIZE_USING_BENCH_VALUE` [Environment variable]
`upsize-using-bench-value` [XML key]

Type: boolean

Default value: false

If set, then the game will automatically upsize a map according to the 'fighter-scale' parameter. Upsizing means: a 160x120 maps becomes 400x300, for instance. Upsizing causes fighters to be smaller because map resolution is higher. This will avoid useless pixelish 'jumbo fighters' look when your computer is powerfull enough to do better.

### 4.12.19 upsize-using-fighter-scale

`--upsize-using-fighter-scale=<value>` [Command-line option]
`LW6_UPSIZE_USING_FIGHTER_SCALE` [Environment variable]
`upsize-using-fighter-scale` [XML key]

Type: boolean

Default value: true

If set, then the game will automatically upsize a map according to the 'fighter-scale' parameter. Upsizing means: a 160x120 maps becomes 400x300, for instance. Upsizing causes fighters to be smaller because map resolution is higher. This can be usefull if you don't want fighters to be too big.

### 4.12.20 view-color-auto

`--view-color-auto=<value>` [Command-line option]
`LW6_VIEW_COLOR_AUTO` [Environment variable]
`view-color-auto` [XML key]

Type: boolean

Default value: true

Defines wether view colors will be set automatically from base and alternate colors. This is a time saver to keep map designers from requiring to redefined every single color in the game. You only need to set color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg. Then view_color_cursor_bg, view_color_cursor_fg, view_color_map_bg and view_color_map_fg will be automatically set.

### 4.12.21 wall-grease

`--wall-grease=<value>` [Command-line option]
`LW6_WALL_GREASE` [Environment variable]

`wall-grease` [XML key]

Type: integer

Default value: 0 Min value: -5 Max value: 5

This parameter allows you to make walls (AKA map foreground) thicker, or thiner, when map is loaded. Indeed, when map are resampled, and especially when they are downscaled, some walls may disappear, or some passages may be blocked. The loader can't automatically figure out wether it's more important to keep an existing wall or to keep an open passage for fighters. This parameter helps doing so, if you set it to a low value, level will be less greasy, and many passages might open themselves. On the contrary, if grease is at a high level, then a thin line of almost isolated pixels might become a thick wall. There's no real garantee your wall or passage will always be present, but it's a same bet to assume on a 'tunnel-like' level one needs to set grease to a low value, and on a 'wide open' level with few walls one needs to set grease to a high value.

## 4.13 Map style.xml

### 4.13.1 animation-density

`--animation-density=<value>` [Command-line option]
`LW6_ANIMATION_DENSITY` [Environment variable]
`animation-density` [XML key]

Type: float

Default value: 1.0f Min value: 0 Max value: 10

Density of the background animation, that is, for instance, if the background animation is about displaying bubbles, using a high value will display many bubbles. A value of 1.0 corresponds to the default setting.

### 4.13.2 animation-speed

`--animation-speed=<value>` [Command-line option]
`LW6_ANIMATION_SPEED` [Environment variable]
`animation-speed` [XML key]

Type: float

Default value: 1.0f Min value: 0 Max value: 10

Speed of the background animation, that is, for instance, if the background animation is about displaying bubbles, using a high value will cause bubbles to move very fast. A value of 1.0 corresponds to the default setting.

### 4.13.3 background-color-root-bg

`--background-color-root-bg=<value>` [Command-line option]
`LW6_BACKGROUND_COLOR_ROOT_BG` [Environment variable]
`background-color-root-bg` [XML key]

Type: color

Default value: #000

Defines the main background color. This is, for instance, the color which will be used to clear the screen before drawing thing. Will be automatically guessed from the map texture if color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.4 background-color-root-fg

`--background-color-root-fg=<value>` [Command-line option]
`LW6_BACKGROUND_COLOR_ROOT_FG` [Environment variable]
`background-color-root-fg` [XML key]

Type: color

Default value: #ccc

Defines a color which will be used together with color-base-bg to compose the background. It can be wise to have a minimum contrast between this color and color-base-bg, but it is not mandatory, especially if other colors are manually redefined. Will be automatically guessed from the map texture if color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.5 background-color-stuff-bg

`--background-color-stuff-bg=<value>` [Command-line option]
`LW6_BACKGROUND_COLOR_STUFF_BG` [Environment variable]
`background-color-stuff-bg` [XML key]

Type: color

Default value: #333

Defines a color which will be used together with color-alternate-fg to draw things (animations, sprites, text, whatever) in the background. It should be different enough from color-alternate-fg so that one can really distinguish these colors. Will be automatically guessed from the map texture if color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.6 background-color-stuff-fg

`--background-color-stuff-fg=<value>` [Command-line option]
`LW6_BACKGROUND_COLOR_STUFF_FG` [Environment variable]
`background-color-stuff-fg` [XML key]

Type: color

Default value: #fff

Defines a color which will be used to draw things (animations, sprites, text, whatever) in the background. It should be different enough from color-alternate-bg so that one can really distinguish these colors. Think of this as the sprite, the text, the whatever-needs-to-be-seen-uses-this color. Will be automatically guessed from the map texture if color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.7 background-style

`--background-style=<value>` [Command-line option]
`LW6_BACKGROUND_STYLE` [Environment variable]

`background-style` [XML key]

Type: string

Default value: bubbles

The background defines, of course, what is displayed at the background, but it also conditions the colors used for other items, such as the menus for instance. The possible values are 'void' and 'bubbles'.

### 4.13.8 blink-cursor

`--blink-cursor=<value>` [Command-line option]
`LW6_BLINK_CURSOR` [Environment variable]
`blink-cursor` [XML key]

Type: boolean

Default value: false

If set, then cursor will blink, allowing you to see what's under the cursor. It's just a matter of taste, you might to always have your cursor displayed, or prefer to have it disappear from time to time so that you can see the action below

### 4.13.9 color-alternate-bg

`--color-alternate-bg=<value>` [Command-line option]
`LW6_COLOR_ALTERNATE_BG` [Environment variable]
`color-alternate-bg` [XML key]

Type: color

Default value: #333

Defines the alternate color, more precisely, its bg (background) part. Colors are always defined by a bg/fg pair. Most colors in the game can be deduced from this one, usually to color a map you only need to define color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg.

### 4.13.10 color-alternate-fg

`--color-alternate-fg=<value>` [Command-line option]
`LW6_COLOR_ALTERNATE_FG` [Environment variable]
`color-alternate-fg` [XML key]

Type: color

Default value: #fff

Defines the alternate color, more precisely, its fg (foreground) part. Colors are always defined by a bg/fg pair. Most colors in the game can be deduced from this one, usually to color a map you only need to define color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg.

### 4.13.11 color-base-bg

`--color-base-bg=<value>` [Command-line option]
`LW6_COLOR_BASE_BG` [Environment variable]

`color-base-bg` [XML key]

Type: color

Default value: #000

Defines the base color, more precisely, its bg (background) part. Colors are always defined by a bg/fg pair. Most colors in the game can be deduced from this one, usually to color a map you only need to define color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg.

### 4.13.12 color-base-fg

`--color-base-fg=<value>` [Command-line option]
`LW6_COLOR_BASE_FG` [Environment variable]
`color-base-fg` [XML key]

Type: color

Default value: #ccc

Defines the base color, more precisely, its fg (foreground) part. Colors are always defined by a bg/fg pair. Most colors in the game can be deduced from this one, usually to color a map you only need to define color-base-bg, color-base-fg, color-alternate-bg and color-alternate-fg.

### 4.13.13 colorize

`--colorize=<value>` [Command-line option]
`LW6_COLORIZE` [Environment variable]
`colorize` [XML key]

Type: boolean

Default value: true

If set, then all background drawings including textures will use the background colors. This means, for instance, that if background colors are set automatically by color-auto from the map texture, then the background will adopt the same range of colors than the map itself. In short, the background will mimic the map.

### 4.13.14 colorize-cursor

`--colorize-cursor=<value>` [Command-line option]
`LW6_COLORIZE_CURSOR` [Environment variable]
`colorize-cursor` [XML key]

Type: boolean

Default value: true

If set, then all cursors will use the automatic guessed colors, or the specified colors, but basically they won't be displayed using their native colors. This can be usefull for you can wish to use a generic non-colored texture for your cursor and let it be colorized automatically so that it's accorded to the level.

### 4.13.15 cursor-size

`--cursor-size=<value>` [Command-line option]
`LW6_CURSOR_SIZE` [Environment variable]
`cursor-size` [XML key]

Type: float

Default value: 1.0f Min value: 0 Max value: 10

Size of the cursors on the map. 1 is the default, setting it to a higher value will make cursors bigger, a lower value will make them smaller.

### 4.13.16 hidden-layer-alpha

`--hidden-layer-alpha=<value>` [Command-line option]
`LW6_HIDDEN_LAYER_ALPHA` [Environment variable]
`hidden-layer-alpha` [XML key]

Type: float

Default value: 0.1f Min value: 0 Max value: 1

Whenever players are supposed to be hidden behind a wall, for instance if they are in layer 2 and layer 1 is filled with walls, it's still possible to see them, but with a low alpha value (almost transparent). This parameter allows you to trick this value, 0 will make these players absolutely invisible, 1 will make them totally opaque, like if they were on layer 1.

### 4.13.17 hud-color-frame-bg

`--hud-color-frame-bg=<value>` [Command-line option]
`LW6_HUD_COLOR_FRAME_BG` [Environment variable]
`hud-color-frame-bg` [XML key]

Type: color

Default value: #000

Defines the background color for the hud frame. Ignored if hud-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.18 hud-color-frame-fg

`--hud-color-frame-fg=<value>` [Command-line option]
`LW6_HUD_COLOR_FRAME_FG` [Environment variable]
`hud-color-frame-fg` [XML key]

Type: color

Default value: #ccc

Defines the foreground color for the hud frame. Ignored if hud-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.19 hud-color-text-bg

`--hud-color-text-bg=<value>` [Command-line option]
`LW6_HUD_COLOR_TEXT_BG` [Environment variable]

`hud-color-text-bg` [XML key]

Type: color

Default value: #333

Defines the background color for hud text. Ignored if hud-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.20 hud-color-text-fg

`--hud-color-text-fg=<value>` [Command-line option]
`LW6_HUD_COLOR_TEXT_FG` [Environment variable]
`hud-color-text-fg` [XML key]

Type: color

Default value: #fff

Defines the foreground color for hud text. Ignored if hud-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.21 hud-style

`--hud-style=<value>` [Command-line option]
`LW6_HUD_STYLE` [Environment variable]
`hud-style` [XML key]

Type: string

Default value: floating

The hud is where informations about the game are displayed. This means, who is winning, are other status-like informations. Possible values include 'floating' and 'tactical'.

### 4.13.22 keep-ratio

`--keep-ratio=<value>` [Command-line option]
`LW6_KEEP_RATIO` [Environment variable]
`keep-ratio` [XML key]

Type: boolean

Default value: true

Defines wether the map should keep its ratio, or if it should be stretched to fill the shape of your screen.

### 4.13.23 menu-color-default-bg

`--menu-color-default-bg=<value>` [Command-line option]
`LW6_MENU_COLOR_DEFAULT_BG` [Environment variable]
`menu-color-default-bg` [XML key]

Type: color

Default value: #333

Defines the default background color for menus. Ignored if menu-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.24 menu-color-default-fg

`--menu-color-default-fg=<value>` [Command-line option]
`LW6_MENU_COLOR_DEFAULT_FG` [Environment variable]
`menu-color-default-fg` [XML key]

Type: color

Default value: #fff

Defines the default foreground color for menus. In fact, this is the main color for menu text, the color used to draw letters in menus. Ignored if menu-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.25 menu-color-disabled-bg

`--menu-color-disabled-bg=<value>` [Command-line option]
`LW6_MENU_COLOR_DISABLED_BG` [Environment variable]
`menu-color-disabled-bg` [XML key]

Type: color

Default value: #000

Defines the background color for a disabled menu item. Ignored if menu-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.26 menu-color-disabled-fg

`--menu-color-disabled-fg=<value>` [Command-line option]
`LW6_MENU_COLOR_DISABLED_FG` [Environment variable]
`menu-color-disabled-fg` [XML key]

Type: color

Default value: #ccc

Defines the foreground color for a disabled menu item. Ignored if menu-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.27 menu-color-selected-bg

`--menu-color-selected-bg=<value>` [Command-line option]
`LW6_MENU_COLOR_SELECTED_BG` [Environment variable]
`menu-color-selected-bg` [XML key]

Type: color

Default value: #fff

Defines the background color for a selected menu item. Ignored if menu-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.28 menu-color-selected-fg

`--menu-color-selected-fg=<value>` [Command-line option]
`LW6_MENU_COLOR_SELECTED_FG` [Environment variable]
`menu-color-selected-fg` [XML key]

Type: color

Default value: #333

Defines the foreground color for a selected menu item. Ignored if menu-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.29 menu-style

`--menu-style=<value>` [Command-line option]
`LW6_MENU_STYLE` [Environment variable]
`menu-style` [XML key]

Type: string

Default value: cylinder

The menu style is simply the name of the engine used to power the menu system. The only possible value, for now, is 'cylinder'.

### 4.13.30 music-exclude

`--music-exclude=<value>` [Command-line option]
`LW6_MUSIC_EXCLUDE` [Environment variable]
`music-exclude` [XML key]

Type: string

Default value: Chadburn

If this string is found in a music file name, it will be excluded from the list when playing in random mode.

### 4.13.31 music-file

`--music-file=<value>` [Command-line option]
`LW6_MUSIC_FILE` [Environment variable]
`music-file` [XML key]

Type: string

Default value:

Allows you to play a custom music file (typically your own ogg music) and override default game music. If file does not exist, game will use its internal music. The file will be searched for in the current 'music-path' but also in the current map directory. No absolute or even relative path are allowed, only a plain filename with no slash or backslash. Avoid special characters at all cost.

### 4.13.32 music-filter

`--music-filter=<value>` [Command-line option]
`LW6_MUSIC_FILTER` [Environment variable]
`music-filter` [XML key]

Type: string

Default value:

A music filter, used when files are played randomly. This is not a complex regex-enabled filter, just a plain string search. Even the '*' wildcard won't work. If you want precise control on what music file to play, please consider reorganizing your files and/or use the 'music-file' parameter.

### 4.13.33 pixelize

`--pixelize=<value>` [Command-line option]
`LW6_PIXELIZE` [Environment variable]
`pixelize` [XML key]

Type: boolean

Default value: false

Depending on the renderer capabilities, will try to pixelize some parts of the game. This can be used to emulate the old LW5 appearance.

### 4.13.34 system-color-bg

`--system-color-bg=<value>` [Command-line option]
`LW6_SYSTEM_COLOR_BG` [Environment variable]
`system-color-bg` [XML key]

Type: color

Default value: #333

Defines the system background color, used when displaying system info, such as the number of frames per second. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.35 system-color-fg

`--system-color-fg=<value>` [Command-line option]
`LW6_SYSTEM_COLOR_FG` [Environment variable]
`system-color-fg` [XML key]

Type: color

Default value: #fff

Defines the system foreground color, used when displaying system info, such as the number of frames per second. This will typically be text color. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.36 team-color-blue

`--team-color-blue=<value>` [Command-line option]
`LW6_TEAM_COLOR_BLUE` [Environment variable]
`team-color-blue` [XML key]

Type: color

Default value: #00f

Defines the color for the blue team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.37 team-color-cyan

`--team-color-cyan=<value>` [Command-line option]
`LW6_TEAM_COLOR_CYAN` [Environment variable]
`team-color-cyan` [XML key]

Type: color

Default value: #0ff

Defines the color for the cyan team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.38 team-color-dead

`--team-color-dead=<value>` [Command-line option]
`LW6_TEAM_COLOR_DEAD` [Environment variable]
`team-color-dead` [XML key]

Type: color

Default value: #000

Defines the color for the teams when they are dead. By default it is black, this means when a team is weak it becomes black. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.39 team-color-green

`--team-color-green=<value>` [Command-line option]
`LW6_TEAM_COLOR_GREEN` [Environment variable]
`team-color-green` [XML key]

Type: color

Default value: #0f0

Defines the color for the green team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.40 team-color-lightblue

`--team-color-lightblue=<value>` [Command-line option]
`LW6_TEAM_COLOR_LIGHTBLUE` [Environment variable]
`team-color-lightblue` [XML key]

Type: color

Default value: #8bf

Defines the color for the light blue team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.41 team-color-magenta

`--team-color-magenta=<value>` [Command-line option]
`LW6_TEAM_COLOR_MAGENTA` [Environment variable]
`team-color-magenta` [XML key]

Type: color

Default value: #f0f

Defines the color for the magenta team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.42 team-color-orange

`--team-color-orange=<value>` [Command-line option]
`LW6_TEAM_COLOR_ORANGE` [Environment variable]
`team-color-orange` [XML key]

Type: color

Default value: #f80

Defines the color for the orange team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.43 team-color-pink

`--team-color-pink=<value>` [Command-line option]
`LW6_TEAM_COLOR_PINK` [Environment variable]
`team-color-pink` [XML key]

Type: color

Default value: #f8b

Defines the color for the pink team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.44 team-color-purple

`--team-color-purple=<value>` [Command-line option]
`LW6_TEAM_COLOR_PURPLE` [Environment variable]
`team-color-purple` [XML key]

Type: color

Default value: #b8f

Defines the color for the purple team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.45 team-color-red

`--team-color-red=<value>` [Command-line option]
`LW6_TEAM_COLOR_RED` [Environment variable]
`team-color-red` [XML key]

Type: color

Default value: #f00

Defines the color for the red team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.46 team-color-yellow

`--team-color-yellow=<value>` [Command-line option]
`LW6_TEAM_COLOR_YELLOW` [Environment variable]
`team-color-yellow` [XML key]

Type: color

Default value: #ff0

Defines the color for the yellow team. Syntax is HTML-like, #RGB or #RRGGBB.

### 4.13.47 view-color-cursor-bg

`--view-color-cursor-bg=<value>` [Command-line option]
`LW6_VIEW_COLOR_CURSOR_BG` [Environment variable]
`view-color-cursor-bg` [XML key]

Type: color

Default value: #333

Defines the background cursor color. Will typically be used to draw the shape of the cursor. Ignored if view-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.48 view-color-cursor-fg

`--view-color-cursor-fg=<value>` [Command-line option]
`LW6_VIEW_COLOR_CURSOR_FG` [Environment variable]
`view-color-cursor-fg` [XML key]

Type: color

Default value: #fff

Defines the foreground cursor color. Will typically be used to draw text in the cursor. Ignored if view-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.49 view-color-map-bg

`--view-color-map-bg=<value>` [Command-line option]
`LW6_VIEW_COLOR_MAP_BG` [Environment variable]
`view-color-map-bg` [XML key]

Type: color

Default value: #000

Defines the background map color. If there's no map texture defined or if use-texture is false, this is the color of the places where armies will go. Ignored if view-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.50 view-color-map-fg

`--view-color-map-fg=<value>` [Command-line option]
`LW6_VIEW_COLOR_MAP_FG` [Environment variable]
`view-color-map-fg` [XML key]

Type: color

Default value: #ccc

Defines the foreground map color. If there's no map texture defined or if use-texture is false, this is the color of walls, what armies can't go through. Ignored if view-color-auto is set. Can be #RGB, #RGBA, #RRGGBB or #RRGGBBAA.

### 4.13.51 view-style

`--view-style=<value>` [Command-line option]
`LW6_VIEW_STYLE` [Environment variable]
`view-style` [XML key]

Type: string

Default value: flat

The view style conditions which renderer is used for the map, the area where fighters are displayed. This is not the graphics backend. Indeed, the graphics backend defines which technical tool one uses (which library) one runs, wether this parameter says what kind of rendering one wants.

### 4.13.52 waves

`--waves=<value>` [Command-line option]
`LW6_WAVES` [Environment variable]
`waves` [XML key]

Type: boolean

Default value: true

Activates the wave effect, that's to say level appears to be under water when playing.

### 4.13.53 x-wrap

`--x-wrap=<value>` [Command-line option]
`LW6_X_WRAP` [Environment variable]
`x-wrap` [XML key]

Type: boolean

Default value: true

Defines wether the map should be wrapped on the x axis. This is the companion of 'x-polarity', if no polarity is defined, map can't be wrapped, but in some cases, one might wish to have a map with polarity but without wrapping if, for instance, textures do not tile nicely.

### 4.13.54 y-wrap

`--y-wrap=<value>` [Command-line option]
`LW6_Y_WRAP` [Environment variable]
`y-wrap` [XML key]

Type: boolean

Default value: true

Defines wether the map should be wrapped on the y axis. This is the companion of 'y-polarity', if no polarity is defined, map can't be wrapped, but in some cases, one might wish to have a map with polarity but without wrapping if, for instance, textures do not tile nicely.

### 4.13.55 zoom

`--zoom=<value>` [Command-line option]
`LW6_ZOOM` [Environment variable]
`zoom` [XML key]

Type: float

Default value: 1.0f

Defines the map zoom. If lower than 1.0, map will occupy only a fraction of the screen, if greater than 1.0, some areas will be outside the screen, and the player will need to scroll through it.

### 4.13.56 zoom-max

`--zoom-max=<value>` [Command-line option]
`LW6_ZOOM_MAX` [Environment variable]
`zoom-max` [XML key]

Type: float

Default value: 30.0f

Defines the max map zoom. If set to a high value, you'll be able to dynamically view the map with hudge fighters, seeing only a fraction of the level.

### 4.13.57 zoom-min

`--zoom-min=<value>` [Command-line option]
`LW6_ZOOM_MIN` [Environment variable]
`zoom-min` [XML key]

Type: float

Default value: 0.3f

Defines the min map zoom. If set to a low value, you'll be able to dynamically view a very small, reduced map.

## 4.14 Map teams.xml

### 4.14.1 bot-iq

`--bot-iq=<value>` [Command-line option]
`LW6_BOT_IQ` [Environment variable]
`bot-iq` [XML key]

Type: integer

Default value: 100 Min value: 0 Max value: 200

The IQ (intelligence quotient) of bots. Typically, a value of 100 will make the bot behave normally, performing at its best. A value of 0 will just make it act the worst way it can. Values over 100 probably won't change anything compared to 100, but this truely depends on which bot backend you're running.

### 4.14.2 bot-speed

`--bot-speed=<value>` [Command-line option]
`LW6_BOT_SPEED` [Environment variable]
`bot-speed` [XML key]

Type: float

Default value: 1.0f

The speed of bots, 1 means normal speed, higher value will speed it up, lower will slow it down. Note that this only has an impact on bot engines, not on the game speed itself.

### 4.14.3 bot1-ai

`--bot1-ai=<value>` [Command-line option]
`LW6_BOT1_AI` [Environment variable]
`bot1-ai` [XML key]

Type: string

Default value: idiot

AI engine for bot number 1.

### 4.14.4 bot1-color

`--bot1-color=<value>` [Command-line option]
`LW6_BOT1_COLOR` [Environment variable]
`bot1-color` [XML key]

Type: string

Default value: green

Color for bot number 1.

### 4.14.5 bot2-ai

`--bot2-ai=<value>` [Command-line option]
`LW6_BOT2_AI` [Environment variable]
`bot2-ai` [XML key]

Type: string

Default value: idiot

AI engine for bot number 2.

### 4.14.6 bot2-color

`--bot2-color=<value>` [Command-line option]
`LW6_BOT2_COLOR` [Environment variable]
`bot2-color` [XML key]

Type: string

Default value: blue

Color for bot number 2.

### 4.14.7 bot3-ai

`--bot3-ai=<value>` [Command-line option]
`LW6_BOT3_AI` [Environment variable]
`bot3-ai` [XML key]

Type: string

Default value: random

AI engine for bot number 3.

### 4.14.8 bot3-color

`--bot3-color=<value>` [Command-line option]
`LW6_BOT3_COLOR` [Environment variable]
`bot3-color` [XML key]

Type: string

Default value: yellow

Color for bot number 3.

### 4.14.9 bot4-ai

`--bot4-ai=<value>` [Command-line option]
`LW6_BOT4_AI` [Environment variable]
`bot4-ai` [XML key]

Type: string

Default value: follow

AI engine for bot number 4.

### 4.14.10 bot4-color

`--bot4-color=<value>` [Command-line option]
`LW6_BOT4_COLOR` [Environment variable]
`bot4-color` [XML key]

Type: string

Default value: cyan

Color for bot number 4.

### 4.14.11 bot5-ai

`--bot5-ai=<value>` [Command-line option]
`LW6_BOT5_AI` [Environment variable]
`bot5-ai` [XML key]

Type: string

Default value: random

AI engine for bot number 5.

### 4.14.12 bot5-color

`--bot5-color=<value>` [Command-line option]
`LW6_BOT5_COLOR` [Environment variable]
`bot5-color` [XML key]

Type: string

Default value: magenta

Color for bot number 5.

### 4.14.13 bot6-ai

`--bot6-ai=<value>` [Command-line option]
`LW6_BOT6_AI` [Environment variable]
`bot6-ai` [XML key]

Type: string

Default value: follow

AI engine for bot number 6.

### 4.14.14 bot6-color

`--bot6-color=<value>` [Command-line option]
`LW6_BOT6_COLOR` [Environment variable]
`bot6-color` [XML key]

Type: string

Default value: orange

Color for bot number 6.

### 4.14.15 bot7-ai

`--bot7-ai=<value>` [Command-line option]
`LW6_BOT7_AI` [Environment variable]
`bot7-ai` [XML key]

Type: string

Default value: idiot

AI engine for bot number 7.

### 4.14.16 bot7-color

`--bot7-color=<value>` [Command-line option]
`LW6_BOT7_COLOR` [Environment variable]
`bot7-color` [XML key]

Type: string

Default value: lightblue

Color for bot number 7.

### 4.14.17 bot8-ai

`--bot8-ai=<value>` [Command-line option]
`LW6_BOT8_AI` [Environment variable]
`bot8-ai` [XML key]

Type: string

Default value: idiot

AI engine for bot number 8.

### 4.14.18 bot8-color

`--bot8-color=<value>` [Command-line option]
`LW6_BOT8_COLOR` [Environment variable]
`bot8-color` [XML key]

Type: string

Default value: purple

Color for bot number 8.

### 4.14.19 bot9-ai

`--bot9-ai=<value>` [Command-line option]
`LW6_BOT9_AI` [Environment variable]
`bot9-ai` [XML key]

Type: string

Default value: idiot

AI engine for bot number 9.

### 4.14.20 bot9-color

`--bot9-color=<value>` [Command-line option]
`LW6_BOT9_COLOR` [Environment variable]
`bot9-color` [XML key]

Type: string

Default value: pink

Color for bot number 9.

### 4.14.21 nb-bots

`--nb-bots=<value>` [Command-line option]
`LW6_NB_BOTS` [Environment variable]
`nb-bots` [XML key]

Type: integer

Default value: 2 Min value: 0 Max value: 9

Number of bots on the map. 0 means no bots, if set to 1 the the bot1-... settings will be used, if set to 2 then bot1-... and bot2-... will be used, and so on.

### 4.14.22 player1-color

`--player1-color=<value>` [Command-line option]
`LW6_PLAYER1_COLOR` [Environment variable]
`player1-color` [XML key]

Type: string

Default value: red

Color of the first player, must be red, green, blue, yellow, cyan, magenta, orange, lightblue, purple or pink

### 4.14.23 player2-color

`--player2-color=<value>` [Command-line option]
`LW6_PLAYER2_COLOR` [Environment variable]
`player2-color` [XML key]

Type: string

Default value: green

Color of the second player, must be red, green, blue, yellow, cyan, magenta, orange, lightblue, purple or pink

### 4.14.24 player3-color

`--player3-color=<value>` [Command-line option]
`LW6_PLAYER3_COLOR` [Environment variable]
`player3-color` [XML key]

Type: string

Default value: blue

Color of the third player, must be red, green, blue, yellow, cyan, magenta, orange, lightblue, purple or pink

### 4.14.25 player4-color

`--player4-color=<value>` [Command-line option]
`LW6_PLAYER4_COLOR` [Environment variable]
`player4-color` [XML key]

Type: string

Default value: yellow

Color of the fourth player, must be red, green, blue, yellow, cyan, magenta, orange, lightblue, purple or pink

## 4.15 Advanced settings

### 4.15.1 base64-decode

`--base64-decode` [Command-line option]

If specified, program will take stdin and base64 decode it to stdout. This is for testing purpose (for network messages for instance). Will decode in standard base64 encoding using characters + and / but also the url-compliant version using - and /, see RFC 4648 for details.

### 4.15.2 base64-encode

`--base64-encode` [Command-line option]

If specified, program will take stdin and base64 encode it to stdout. This is for testing purpose (for network messages for instance). Will *not* use standard base64 encoding using characters + and / but - and _ instead to be url-compliant, see RFC 4648 for details.

### 4.15.3 bench

`--bench` [Command-line option]

Runs a benchmarking test which will report an approximative performance estimation of the game on your computer.

### 4.15.4 bench-value

`--bench-value=<value>` [Command-line option]
`LW6_BENCH_VALUE` [Environment variable]
`bench-value` [XML key]

Type: integer

Default value: 20

Contains the current bench value of the computer running the game. This is used internally to choose the right map settings. You can override this value and use your own but... use at your own risk. Pretending you have a faster computer than what you really have can lead to confusion.

### 4.15.5 bin-id

`--bin-id=<value>` [Command-line option]
`LW6_BIN_ID` [Environment variable]
`bin-id` [XML key]

Type: integer

Default value: 0

The internal 'bin-id' value. Note that this is not necessarly equal to the value returned by 'show-build-bin-id'. When they are different, it is assumed this is because of a software upgrade.

### 4.15.6 check

`--check` [Command-line option]

Running the game with '–check' is almost like running '–test', the difference is that '–check' will not run tests which involve graphics or sound backends, so it's adapted to pure console mode. This can be usefull for automated checks on a build farm, or if you want to check things in a headless (pure console) environment.

### 4.15.7 commands-per-sec

`--commands-per-sec=<value>` [Command-line option]
`LW6_COMMANDS_PER_SEC` [Environment variable]
`commands-per-sec` [XML key]

Type: integer

Default value: 10

Defines the number of commands per second. When a command is generated, orders are actually sent to the game engine, for instance, 'this cursor moved there'. So this option will affect game responsiveness, setting this to a high value will make the game more responsive but consume bandwidth on network games.

### 4.15.8 daemon

`--daemon` [Command-line option]

Start the game in daemon mode, this is typically used with the server mode, if you want the process to be detached from the console and executed in the background.

### 4.15.9 debug-layer-id

`--debug-layer-id=<value>` [Command-line option]
`LW6_DEBUG_LAYER_ID` [Environment variable]
`debug-layer-id` [XML key]

Type: integer

Default value: 0 Min value: 0 Max value: 6

A team id which will be used for debugging purposes, for instance when displaying gradient.

### 4.15.10 debug-team-id

`--debug-team-id=<value>` [Command-line option]
`LW6_DEBUG_TEAM_ID` [Environment variable]
`debug-team-id` [XML key]

Type: integer

Default value: 0 Min value: 0 Max value: 9

A team id which will be used for debugging purposes, for instance when displaying gradient.

### 4.15.11 demo

`--demo` [Command-line option]

Start the game in demo mode. 2 bots play against each other forever.

### 4.15.12 dirty-read

`--dirty-read=<value>` [Command-line option]
`LW6_DIRTY_READ` [Environment variable]
`dirty-read` [XML key]

Type: integer

Default value: 2 Min value: 0 Max value: 2

How to handle dirty reads and locks when displaying stuff. If set to 0, there will be no dirty reads at all, a lock (mutex) will be set whenever it's needed. If set to 1, display might be done with inconsistent data, however the data itself won't be modified while displaying. If set to 2, displayed data can (and will) be modified while the rendering thread is running.

### 4.15.13 display-background

`--display-background=<value>` [Command-line option]
`LW6_DISPLAY_BACKGROUND` [Environment variable]

`display-background` [XML key]

Type: boolean

Default value: true

Decides wether the background animation/image should be displayed at all.

### 4.15.14 display-console

`--display-console=<value>` [Command-line option]
`LW6_DISPLAY_CONSOLE` [Environment variable]
`display-console` [XML key]

Type: boolean

Default value: false

Defines wether the interactive system console must be displayed. Note that console support must have been enabled at compilation time. It might not be available on your computer, for instance if you are running a system such as Microsoft Windows.

### 4.15.15 display-cursors

`--display-cursors=<value>` [Command-line option]
`LW6_DISPLAY_CURSORS` [Environment variable]
`display-cursors` [XML key]

Type: boolean

Default value: true

Debugging option which can be set to 'false' to disable the display of cursors when playing.

### 4.15.16 display-debug-gradient

`--display-debug-gradient=<value>` [Command-line option]
`LW6_DISPLAY_DEBUG_GRADIENT` [Environment variable]
`display-debug-gradient` [XML key]

Type: boolean

Default value: false

Set this to 'true' to display the gradient, this is usefull to debug the core algorithm or understand how it works.

### 4.15.17 display-debug-zones

`--display-debug-zones=<value>` [Command-line option]
`LW6_DISPLAY_DEBUG_ZONES` [Environment variable]
`display-debug-zones` [XML key]

Type: boolean

Default value: false

Set this to 'true' to display the zones, this is usefull to debug the core algorithm or understand how it works.

### 4.15.18 display-fighters

`--display-fighters=<value>` [Command-line option]
`LW6_DISPLAY_FIGHTERS` [Environment variable]
`display-fighters` [XML key]

Type: boolean

Default value: true

Debugging option which can be set to 'false' to disable the display of fighters when playing.

### 4.15.19 display-fps

`--display-fps=<value>` [Command-line option]
`LW6_DISPLAY_FPS` [Environment variable]
`display-fps` [XML key]

Type: boolean

Default value: false

Set this to 'true' to display the number of frames per second. When this gets too low... play a smaller map, buy a new computer or contribute and hack Liquid War 6 so that it runs faster!

### 4.15.20 display-hud

`--display-hud=<value>` [Command-line option]
`LW6_DISPLAY_HUD` [Environment variable]
`display-hud` [XML key]

Type: boolean

Default value: true

Decides wether the hud (informations while playing) should be displayed.

### 4.15.21 display-log

`--display-log=<value>` [Command-line option]
`LW6_DISPLAY_LOG` [Environment variable]
`display-log` [XML key]

Type: boolean

Default value: true

Set this to 'false' to disable the display of error messages on the screen. Mote that you can miss valuable informations.

### 4.15.22 display-map

`--display-map=<value>` [Command-line option]
`LW6_DISPLAY_MAP` [Environment variable]
`display-map` [XML key]

Type: boolean

Default value: true

Debugging option which can be set to 'false' to disable map (level) display when playing.

### 4.15.23 display-menu

`--display-menu=<value>` [Command-line option]
`LW6_DISPLAY_MENU` [Environment variable]
`display-menu` [XML key]

Type: boolean

Default value: true

Debugging option which can be set to 'false' to disable the display of menus.

### 4.15.24 display-meta

`--display-meta=<value>` [Command-line option]
`LW6_DISPLAY_META` [Environment variable]
`display-meta` [XML key]

Type: boolean

Default value: true

Set to 'false' to disable the display of meta information, this includes the help, tootips and breadcrumbs in menus.

### 4.15.25 display-mouse

`--display-mouse=<value>` [Command-line option]
`LW6_DISPLAY_MOUSE` [Environment variable]
`display-mouse` [XML key]

Type: boolean

Default value: true

Set this to 'false' to always hide the mouse pointer.

### 4.15.26 display-mps

`--display-mps=<value>` [Command-line option]
`LW6_DISPLAY_MPS` [Environment variable]
`display-mps` [XML key]

Type: boolean

Default value: false

Set this to 'true' to display the number of moves per second. In theory the game should maintain this constant but in practise it can get low if your computer is too slow or too busy.

### 4.15.27 display-preview

`--display-preview=<value>` [Command-line option]
`LW6_DISPLAY_PREVIEW` [Environment variable]
`display-preview` [XML key]

Type: boolean

Default value: true

Decides wether a map preview should be displayed when choosing a level.

### 4.15.28 display-progress

`--display-progress=<value>` [Command-line option]
`LW6_DISPLAY_PROGRESS` [Environment variable]
`display-progress` [XML key]

Type: boolean

Default value: true

Decides wether a progress bar should be displayed when a long operation is realized as a background task.

### 4.15.29 display-score

`--display-score=<value>` [Command-line option]
`LW6_DISPLAY_SCORE` [Environment variable]
`display-score` [XML key]

Type: boolean

Default value: true

Decides wether the score screen should be displayed.

### 4.15.30 display-splash

`--display-splash=<value>` [Command-line option]
`LW6_DISPLAY_SPLASH` [Environment variable]
`display-splash` [XML key]

Type: boolean

Default value: true

Set this to 'false' to disable the display of the splash screen at game startup.

### 4.15.31 display-url

`--display-url=<value>` [Command-line option]
`LW6_DISPLAY_URL` [Environment variable]
`display-url` [XML key]

Type: boolean

Default value: false

Set this to 'true' to display the URL (homepage) of the game. This is mostly used when doing screenshots, so that generated images contain a link to the homepage.

### 4.15.32 executed-again

`--executed-again=<value>` [Command-line option]
`LW6_EXECUTED_AGAIN` [Environment variable]
`executed-again` [XML key]

Type: boolean

Default value: false

This environment variable/keyword is used to detect wether the program has been launched by itself with an internal execv call. This is used as a workarround to set some environment variables (DYLD_LIBRARY_PATH on Mac OS X for instance) before the program is run, as sometimes using setenv() inside the program does not work.

### 4.15.33 gfx-cpu-usage

`--gfx-cpu-usage=<value>` [Command-line option]
`LW6_GFX_CPU_USAGE` [Environment variable]
`gfx-cpu-usage` [XML key]

Type: float

Default value: 0.75 Min value: 0 Max value: 1

Percentage of the CPU which will be used by the display thread. It's wise to leave some time to other threads to execute. The OS does it naturally, but setting this helps the whole process by explicitely pausing (sleep call) the display thread. You could change this to a low value if you have lagging games but smooth display.

### 4.15.34 gfx-debug

`--gfx-debug=<value>` [Command-line option]
`LW6_GFX_DEBUG` [Environment variable]
`gfx-debug` [XML key]

Type: boolean

Default value: false

Enables dedicated graphics debugging tools. This is different from 'debug' mode which is global, this one is really graphics specific.

### 4.15.35 io-per-sec

`--io-per-sec=<value>` [Command-line option]
`LW6_IO_PER_SEC` [Environment variable]
`io-per-sec` [XML key]

Type: integer

Default value: 20

Defines the number of calls to input/output functions per second. This can affect speed of menus but also cursors, but won't change the speed of the game itself. It's a cosmectic, comfort option.

### 4.15.36 loader-sleep

`--loader-sleep=<value>` [Command-line option]
`LW6_LOADER_SLEEP` [Environment variable]
`loader-sleep` [XML key]

Type: float

Default value: 0.5

Defines how long the loader thread should wait between two polls. Default value should fit in most cases.

### 4.15.37 log-level

`--log-level=<value>` [Command-line option]
`LW6_LOG_LEVEL` [Environment variable]
`log-level` [XML key]

Type: integer

Default value: 3 Min value: 0 Max value: 4

Defines the log level, that is, how verbose the program will be regarding logs and console output. 0 (ERROR) is the minimum, only errors are reported. 1 (WARNING) means errors + warnings. 2 (NOTICE) displays most important messages. 3 (INFO) is the default, the log file will contain all messages but debug stuff. 4 (DEBUG) logs everything, including debug informations.

### 4.15.38 log-timeout

`--log-timeout=<value>` [Command-line option]
`LW6_LOG_TIMEOUT` [Environment variable]
`log-timeout` [XML key]

Type: integer

Default value: 5000

Delay, in msec, for which a log message will stay displayed on the screen.

### 4.15.39 magic-number

`--magic-number=<value>` [Command-line option]
`LW6_MAGIC_NUMBER` [Environment variable]
`magic-number` [XML key]

Type: integer

Default value: 14741

This 'magic' number probably requires an explanation. It's used to estimate how big a map can be built. The calculus is very approximative, basically bench_value*magic_number=total_fighters_on_map*rounds_per_sec*moves_per_round with total_fighters_on_map depending on various parameters such as map size but also how many fighters are on the map. The map loader will try and adjust the map size so that it is just big enough not to saturate your CPU while being as high-res as possible. The magic number in itself has no real meaning, the higher it gets, the more optimized it means the game is. Normally you shouldn't change this but if you find the map resizing is too agressively pessimistic, or if for some reason bench returns bogus values, you can modify it.

### 4.15.40 max-local-bench-value

`--max-local-bench-value=<value>` [Command-line option]
`LW6_MAX_LOCAL_BENCH_VALUE` [Environment variable]

`max-local-bench-value` [XML key]

Type: integer

Default value: 800

Even if your computer is very fast, this parameter will be used to tame the optimism of the test, and do not load maps in very high detail. It's believed at some point, it's best to keep your extra power to deal with unordinary situations rather than waste it on useless details. Game should be fun with that setting, but if you really want to use your shiny CPU at its maximum, raise this.

### 4.15.41 max-network-bench-value

`--max-network-bench-value=<value>` [Command-line option]
`LW6_MAX_NETWORK_BENCH_VALUE` [Environment variable]
`max-network-bench-value` [XML key]

Type: integer

Default value: 200

On network games, we need to be sure everyone can play in correct conditions, therefore maps won't be loaded with more details than this, by default. You're free to increase this parameter but it can cause your games to be unjoignable by some people.

### 4.15.42 memory-bazooka-eraser

`--memory-bazooka-eraser=<value>` [Command-line option]
`LW6_MEMORY_BAZOOKA_ERASER` [Environment variable]
`memory-bazooka-eraser` [XML key]

Type: boolean

Default value: true

The memory eraser is a tool which will systematically fill allocated memory with 'M', and overwrite all allocated bytes with 'F' before freeing memory. It will even handle realloc calls. This is usefull to track bugs. Indeed, with this option enabled, freshly allocated memory will never contain zeroes unless one calls calloc, and if you ever free some memory zone before being done with it, it will be filled with junk and therefore not be usable. The memory bazooka must be big enough if you want this feature to actually work.

### 4.15.43 memory-bazooka-size

`--memory-bazooka-size=<value>` [Command-line option]
`LW6_MEMORY_BAZOOKA_SIZE` [Environment variable]
`memory-bazooka-size` [XML key]

Type: integer

Default value: 99991

The memory bazooka is a brute-force tool, conceived after a full night spent tracking some memory leak. The idea is to keep a track of all allocated pointers, when the data was allocated (timestamp), where in the code (file, line), and even point out

what data there is in that place. A memory bazooka report at the end of the game will just show what's left. There should be nothing. This parameter is here to avoid wasting CPU cycles on a feature which is very debug-oriented and does not really make sense for the casual user. Set it to 0 for best performance, something like 100 might just be helpfull, but 1000000 is the right way to seriously debug code.

### 4.15.44 net-log

`--net-log=<value>` [Command-line option]
`LW6_NET_LOG` [Environment variable]
`net-log` [XML key]

Type: boolean

Default value: false

Activates network log, that is, logs everything sent/received over the network, except data which is sent through a third party library such as libCurl. This is mostly for debugging purpose, it can lead to rather big log files.

### 4.15.45 network-reliability

`--network-reliability=<value>` [Command-line option]
`LW6_NETWORK_RELIABILITY` [Environment variable]
`network-reliability` [XML key]

Type: integer

Default value: 1000 Min value: 1 Max value: 1000000000

The program assumes network is non-reliable, however the problem with those assumptions is that when you test, network is always reliable, even with non-garanteed protocols like UDP. This option will force the program to actually ignore some calls to send or recv functions, simulating a network disfunction. This is to ensure the internal mecanisms correcting network problems do work for good, on daily regular use. It's not possible to set it to a perfect behavior, never dropping any packet, however using the default settings you probably won't even notice the performance drop induced by having to fix problems. The highest the number is, the most reliable network will look, the algorithm is simply to drop one message out of X.

### 4.15.46 open-relay

`--open-relay=<value>` [Command-line option]
`LW6_OPEN_RELAY` [Environment variable]
`open-relay` [XML key]

Type: boolean

Default value: false

Enables forwarding of abritrary network messages. If open relay is forbidden, the game will only forward messages when physical sender and logical sender are the same. This is to say if messages come from A for C and is sent by A to B, B will forward it to C. But if message comes from X to C and is sent by A to B, then B won't forward it. In practice, it means without open relay, messages can only be forwarded once.

### 4.15.47 pilot-lag

`--pilot-lag=<value>` [Command-line option]
`LW6_PILOT_LAG` [Environment variable]
`pilot-lag` [XML key]

Type: integer

Default value: 10

Maximum lag, in rounds, until the game engine is slowed down. This will typically be usefull if your computer is too slow for the map resolution and the game speed you set up.

### 4.15.48 quick-start

`--quick-start` [Command-line option]

Start the game just like if the player had requested a quick start, without showing any menu.

### 4.15.49 reset

`--reset` [Command-line option]

Clears the config file so that the game will run with defaults next time. The idea is to get rid of traces of previous executions. The difference with '–defaults' is that '–reset' does not run the game, while '–defaults' does.

### 4.15.50 reset-config-on-upgrade

`--reset-config-on-upgrade=<value>` [Command-line option]
`LW6_RESET_CONFIG_ON_UPGRADE` [Environment variable]
`reset-config-on-upgrade` [XML key]

Type: boolean

Default value: true

If set, then a reset (config file set to defaults) is run every time you upgrade the game.

### 4.15.51 server

`--server` [Command-line option]

Start the game in server mode, without requiring any graphics backend. Server mode is usefull if you just want to start a network node without hosting any real game on it. It can be used to list existing nodes and sessions or as a bounce server in case some clients can't contact each other because firewalled. If you only want to start a server game on your computer, don't use this option, just start the game normally and start a game server by clicking on the GUI buttons.

### 4.15.52 simulate-basic

`--simulate-basic` [Command-line option]

Simulates some fights using the basic colors red, green, yellow and blue. Will output on the console a percentage based on scores obtained by the teams. This is typically for map designers and/or people who want to fiddle with team profiles, if some team is really stronger than another one, it should appear in these percentages.

### 4.15.53 simulate-full

`--simulate-full` [Command-line option]

Simulates some fights using all available colors. This can be very long, it will run approximatively 1000 games consecutively, you can look in the log file to see the progress. Will output on the console a percentage based on scores obtained by the teams. This is typically for map designers and/or people who want to fiddle with team profiles, if some team is really stronger than another one, it should appear in these percentages.

### 4.15.54 target-fps

`--target-fps=<value>` [Command-line option]
`LW6_TARGET_FPS` [Environment variable]
`target-fps` [XML key]

Type: integer

Default value: 60

Defines how many frames will be displayed per second. Of course this is a maximum value, if your hardware can't keep up with this value, display will just be slow, no matter what value you define here. Note that you might really wish to have something rather low here, to keep network and 'logic' function responsiveness. Passed 60 frames per second, speed is really only for visual comfort, as Liquid War 6 is now so fast-paced that it requires 200 frames/sec to outperform opponents.

### 4.15.55 trap-errors

`--trap-errors=<value>` [Command-line option]
`LW6_TRAP_ERRORS` [Environment variable]
`trap-errors` [XML key]

Type: boolean

Default value: true

If set to true, will trap segmentation fault and floating point errors, and display messages about those in a custom box instead of the default one

### 4.15.56 trojan

`--trojan=<value>` [Command-line option]
`LW6_TROJAN` [Environment variable]
`trojan` [XML key]

Type: boolean

Default value: false

Make the program act like a (stupid) trojan horse, trying to fake messages, sending various inconsistent informations. This is to check the normal version of the program is able to detect such a fake and kick it out of the game. It's of no use for regular players, be sure to unset this if you want to play for good.

### 4.15.57 z-decode

`--z-decode` [Command-line option]
If specified, program will take stdin and z-decode it to stdout. This is for testing purpose (for network messages for instance). Z-decoding, here means verifying there a Z at the beginning, base64 decode and pass the content through Zlib inflating. I content is not Z-prefixed, will be returned as is.

### 4.15.58 z-encode

`--z-encode` [Command-line option]
If specified, program will take stdin and z-encode it to stdout. This is for testing purpose (for network messages for instance). Z-encoding, here means passing the message through Zlib deflating then base64 encoding and prefix it with a Z.

## 4.16 C to Guile

### 4.16.1 c-gettext

`c-gettext` [C function exported to Guile]
Calls GNU gettext to convert string in current locale. Note that '_' (plain underscode) is exported as well, so that code can be written using '_' as a function.

### 4.16.2 c-lw6-exit

`c-lw6-exit` [C function exported to Guile]
Wrapper on lw6_exit.

### 4.16.3 c-lw6-release

`c-lw6-release` [C function exported to Guile]
Wrapper on lw6_release.

### 4.16.4 c-lw6bot-get-backends

`c-lw6bot-get-backends` [C function exported to Guile]
Wrapper on lw6bot_get_backends.

### 4.16.5 c-lw6bot-new

`c-lw6bot-new` [C function exported to Guile]
Wrapper on lw6bot_new.

### 4.16.6 c-lw6bot-next-move

`c-lw6bot-next-move` [C function exported to Guile]
Wrapper on lw6bot_next_move.

### 4.16.7 c-lw6cfg-defaults

`c-lw6cfg-defaults` [C function exported to Guile]
Wrapper on lw6cfg_defaults.

### 4.16.8 c-lw6cfg-get-option

`c-lw6cfg-get-option` [C function exported to Guile]
Wrapper on lw6cfg_get_option.

### 4.16.9 c-lw6cfg-init

`c-lw6cfg-init` [C function exported to Guile]
Wrapper on lw6cfg_init.

### 4.16.10 c-lw6cfg-load

`c-lw6cfg-load` [C function exported to Guile]
Wrapper on lw6cfg_load.

### 4.16.11 c-lw6cfg-option-exists

`c-lw6cfg-option-exists` [C function exported to Guile]
Wrapper on lw6cfg_option_exists.

### 4.16.12 c-lw6cfg-quit

`c-lw6cfg-quit` [C function exported to Guile]
Wrapper on lw6cfg_quit.

### 4.16.13 c-lw6cfg-save

`c-lw6cfg-save` [C function exported to Guile]
Wrapper on lw6cfg_save.

### 4.16.14 c-lw6cfg-set-option

`c-lw6cfg-set-option` [C function exported to Guile]
Wrapper on lw6cfg_set_option.

### 4.16.15 c-lw6cfg-unified-get-log-file

`c-lw6cfg-unified-get-log-file` [C function exported to Guile]
Wrapper on lw6cfg_unified_get_log_file.

### 4.16.16 c-lw6cfg-unified-get-map-path

`c-lw6cfg-unified-get-map-path` [C function exported to Guile]
Wrapper on lw6cfg_unified_get_map_path.

### 4.16.17 c-lw6cfg-unified-get-music-path

`c-lw6cfg-unified-get-music-path` [C function exported to Guile]
Wrapper on lw6cfg_unified_get_music_path.

### 4.16.18 c-lw6cfg-unified-get-user-dir

`c-lw6cfg-unified-get-user-dir` [C function exported to Guile]
Wrapper on lw6cfg_unified_get_user_dir.

### 4.16.19 c-lw6cli-get-backends

`c-lw6cli-get-backends` [C function exported to Guile]
Wrapper on lw6cli_get_backends.

### 4.16.20 c-lw6cns-init

`c-lw6cns-init` [C function exported to Guile]
Wrapper on lw6cns_init.

### 4.16.21 c-lw6cns-poll

`c-lw6cns-poll` [C function exported to Guile]
Wrapper on lw6cns_poll.

### 4.16.22 c-lw6cns-quit

`c-lw6cns-quit` [C function exported to Guile]
Wrapper on lw6cns_quit.

### 4.16.23 c-lw6cns-support

`c-lw6cns-support` [C function exported to Guile]
Wrapper on lw6cns_support.

### 4.16.24 c-lw6dsp-get-average-fps

`c-lw6dsp-get-average-fps` [C function exported to Guile]
Wrapper on lw6dsp_get_average_fps.

### 4.16.25 c-lw6dsp-get-fullscreen-modes

`c-lw6dsp-get-fullscreen-modes` [C function exported to Guile]
Wrapper on lw6dsp_get_fullscreen_modes.

### 4.16.26 c-lw6dsp-get-instant-fps

`c-lw6dsp-get-instant-fps` [C function exported to Guile]
Wrapper on lw6dsp_get_instant_fps.

### 4.16.27 c-lw6dsp-get-last-frame-rendering-time

`c-lw6dsp-get-last-frame-rendering-time` [C function exported to Guile]
Wrapper on lw6dsp_get_last_frame_rendering_time.

### 4.16.28 c-lw6dsp-get-nb-frames

`c-lw6dsp-get-nb-frames` [C function exported to Guile]
Wrapper on lw6dsp_get_nb_frames.

### 4.16.29 c-lw6dsp-get-video-mode

`c-lw6dsp-get-video-mode` [C function exported to Guile]
Wrapper on lw6dsp_get_video_mode.

### 4.16.30 c-lw6dsp-new

`c-lw6dsp-new` [C function exported to Guile]
Wrapper on lw6dsp_new.

### 4.16.31 c-lw6dsp-release

`c-lw6dsp-release` [C function exported to Guile]
Wrapper on lw6dsp_release.

### 4.16.32 c-lw6dsp-update

`c-lw6dsp-update` [C function exported to Guile]
Wrapper on lw6dsp_update.

### 4.16.33 c-lw6gfx-get-backends

`c-lw6gfx-get-backends` [C function exported to Guile]
Wrapper on lw6gfx_get_backends.

### 4.16.34 c-lw6gui-default-look

`c-lw6gui-default-look` [C function exported to Guile]
Wrapper on lw6gui_default_look.

### 4.16.35 c-lw6gui-input-reset

`c-lw6gui-input-reset` [C function exported to Guile]
Wrapper on lw6gui_input_reset.

### 4.16.36 c-lw6gui-joystick1-get-move-pad

`c-lw6gui-joystick1-get-move-pad` [C function exported to Guile]
Wrapper on lw6gui_joystick1_get_move_pad.

### 4.16.37 c-lw6gui-joystick1-pop-button-a

`c-lw6gui-joystick1-pop-button-a` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_button_a.

### 4.16.38 c-lw6gui-joystick1-pop-button-b

`c-lw6gui-joystick1-pop-button-b` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_button_b.

### 4.16.39 c-lw6gui-joystick1-pop-button-c

`c-lw6gui-joystick1-pop-button-c` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_button_c.

### 4.16.40 c-lw6gui-joystick1-pop-button-d

`c-lw6gui-joystick1-pop-button-d` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_button_d.

### 4.16.41 c-lw6gui-joystick1-pop-button-e

`c-lw6gui-joystick1-pop-button-e` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_button_e.

### 4.16.42 c-lw6gui-joystick1-pop-button-f

`c-lw6gui-joystick1-pop-button-f` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_button_f.

### 4.16.43 c-lw6gui-joystick1-pop-pad-down

`c-lw6gui-joystick1-pop-pad-down` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_pad_down.

### 4.16.44 c-lw6gui-joystick1-pop-pad-left

`c-lw6gui-joystick1-pop-pad-left` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_pad_left.

### 4.16.45 c-lw6gui-joystick1-pop-pad-right

`c-lw6gui-joystick1-pop-pad-right` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_pad_right.

### 4.16.46 c-lw6gui-joystick1-pop-pad-up

`c-lw6gui-joystick1-pop-pad-up` [C function exported to Guile]
Wrapper on lw6gui_joystick1_pop_pad_up.

### 4.16.47 c-lw6gui-joystick2-get-move-pad

`c-lw6gui-joystick2-get-move-pad` [C function exported to Guile]
Wrapper on lw6gui_joystick2_get_move_pad.

### 4.16.48 c-lw6gui-joystick2-pop-button-a

`c-lw6gui-joystick2-pop-button-a` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_button_a.

### 4.16.49 c-lw6gui-joystick2-pop-button-b

`c-lw6gui-joystick2-pop-button-b` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_button_b.

### 4.16.50 c-lw6gui-joystick2-pop-button-c

`c-lw6gui-joystick2-pop-button-c` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_button_c.

### 4.16.51 c-lw6gui-joystick2-pop-button-d

`c-lw6gui-joystick2-pop-button-d` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_button_d.

### 4.16.52 c-lw6gui-joystick2-pop-button-e

`c-lw6gui-joystick2-pop-button-e` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_button_e.

### 4.16.53 c-lw6gui-joystick2-pop-button-f

`c-lw6gui-joystick2-pop-button-f` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_button_f.

### 4.16.54 c-lw6gui-joystick2-pop-pad-down

`c-lw6gui-joystick2-pop-pad-down` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_pad_down.

### 4.16.55 c-lw6gui-joystick2-pop-pad-left

`c-lw6gui-joystick2-pop-pad-left` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_pad_left.

### 4.16.56 c-lw6gui-joystick2-pop-pad-right

`c-lw6gui-joystick2-pop-pad-right` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_pad_right.

### 4.16.57 c-lw6gui-joystick2-pop-pad-up

`c-lw6gui-joystick2-pop-pad-up` [C function exported to Guile]
Wrapper on lw6gui_joystick2_pop_pad_up.

### 4.16.58 c-lw6gui-keyboard-get-move-pad

`c-lw6gui-keyboard-get-move-pad` [C function exported to Guile]
Wrapper on lw6gui_keyboard_get_move_pad.

### 4.16.59 c-lw6gui-keyboard-is-pressed

`c-lw6gui-keyboard-is-pressed` [C function exported to Guile]
Wrapper on lw6gui_keyboard_is_pressed.

### 4.16.60 c-lw6gui-keyboard-pop-arrow-down

`c-lw6gui-keyboard-pop-arrow-down` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_arrow_down.

### 4.16.61 c-lw6gui-keyboard-pop-arrow-left

`c-lw6gui-keyboard-pop-arrow-left` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_arrow_left.

### 4.16.62 c-lw6gui-keyboard-pop-arrow-right

`c-lw6gui-keyboard-pop-arrow-right` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_arrow_right.

### 4.16.63 c-lw6gui-keyboard-pop-arrow-up

`c-lw6gui-keyboard-pop-arrow-up` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_arrow_up.

### 4.16.64 c-lw6gui-keyboard-pop-key-alt

`c-lw6gui-keyboard-pop-key-alt` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_key_alt.

### 4.16.65 c-lw6gui-keyboard-pop-key-ctrl

`c-lw6gui-keyboard-pop-key-ctrl` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_key_ctrl.

### 4.16.66 c-lw6gui-keyboard-pop-key-enter

`c-lw6gui-keyboard-pop-key-enter` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_key_enter.

### 4.16.67 c-lw6gui-keyboard-pop-key-esc

`c-lw6gui-keyboard-pop-key-esc` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_key_esc.

### 4.16.68 c-lw6gui-keyboard-pop-key-pgdown

`c-lw6gui-keyboard-pop-key-pgdown` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_key_pgdown.

### 4.16.69 c-lw6gui-keyboard-pop-key-pgup

`c-lw6gui-keyboard-pop-key-pgup` [C function exported to Guile]
Wrapper on lw6gui_keyboard_pop_key_pgup.

### 4.16.70 c-lw6gui-look-get

`c-lw6gui-look-get` [C function exported to Guile]
Wrapper on lw6gui_look_get.

### 4.16.71 c-lw6gui-look-set

`c-lw6gui-look-set` [C function exported to Guile]
Wrapper on lw6gui_look_set.

### 4.16.72 c-lw6gui-look-zoom-in

`c-lw6gui-look-zoom-in` [C function exported to Guile]
Wrapper on lw6gui_look_zoom_in.

### 4.16.73 c-lw6gui-look-zoom-out

`c-lw6gui-look-zoom-out` [C function exported to Guile]
Wrapper on lw6gui_look_zoom_out.

### 4.16.74 c-lw6gui-menu-append

`c-lw6gui-menu-append` [C function exported to Guile]
Wrapper on lw6gui_menu_append.

### 4.16.75 c-lw6gui-menu-close-popup

`c-lw6gui-menu-close-popup` [C function exported to Guile]
Wrapper on lw6gui_menu_close_popup.

### 4.16.76 c-lw6gui-menu-enable-esc

`c-lw6gui-menu-enable-esc` [C function exported to Guile]
Wrapper on lw6gui_menu_enable_esc.

### 4.16.77 c-lw6gui-menu-has-popup

`c-lw6gui-menu-has-popup` [C function exported to Guile]
Wrapper on lw6gui_menu_has_popup.

### 4.16.78 c-lw6gui-menu-new

`c-lw6gui-menu-new` [C function exported to Guile]
Wrapper on lw6gui_menu_new.

### 4.16.79 c-lw6gui-menu-scroll-down

`c-lw6gui-menu-scroll-down` [C function exported to Guile]
Wrapper on lw6gui_menu_scroll_down.

### 4.16.80 c-lw6gui-menu-scroll-up

`c-lw6gui-menu-scroll-up` [C function exported to Guile]
Wrapper on lw6gui_menu_scroll_up.

### 4.16.81 c-lw6gui-menu-select

`c-lw6gui-menu-select` [C function exported to Guile]
Wrapper on lw6gui_menu_select.

### 4.16.82 c-lw6gui-menu-select-esc

`c-lw6gui-menu-select-esc` [C function exported to Guile]
Wrapper on lw6gui_menu_select_esc.

### 4.16.83 c-lw6gui-menu-set-breadcrumbs

`c-lw6gui-menu-set-breadcrumbs` [C function exported to Guile]
Wrapper on lw6gui_menu_set_breadcrumbs.

### 4.16.84 c-lw6gui-menu-sync

`c-lw6gui-menu-sync` [C function exported to Guile]
Wrapper on lw6gui_menu_sync.

### 4.16.85 c-lw6gui-mouse-get-state

`c-lw6gui-mouse-get-state` [C function exported to Guile]
Wrapper on lw6gui_mouse_get_state.

### 4.16.86 c-lw6gui-mouse-poll-move

`c-lw6gui-mouse-poll-move` [C function exported to Guile]
Wrapper on lw6gui_mouse_poll_move.

### 4.16.87 c-lw6gui-mouse-pop-button-left

`c-lw6gui-mouse-pop-button-left` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_button_left.

### 4.16.88 c-lw6gui-mouse-pop-button-middle

`c-lw6gui-mouse-pop-button-middle` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_button_middle.

### 4.16.89 c-lw6gui-mouse-pop-button-right

`c-lw6gui-mouse-pop-button-right` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_button_right.

### 4.16.90 c-lw6gui-mouse-pop-double-click

`c-lw6gui-mouse-pop-double-click` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_double_click.

### 4.16.91 c-lw6gui-mouse-pop-simple-click

`c-lw6gui-mouse-pop-simple-click` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_simple_click.

### 4.16.92 c-lw6gui-mouse-pop-triple-click

`c-lw6gui-mouse-pop-triple-click` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_triple_click.

### 4.16.93 c-lw6gui-mouse-pop-wheel-down

`c-lw6gui-mouse-pop-wheel-down` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_wheel_down.

### 4.16.94 c-lw6gui-mouse-pop-wheel-up

`c-lw6gui-mouse-pop-wheel-up` [C function exported to Guile]
Wrapper on lw6gui_mouse_pop_wheel_up.

### 4.16.95 c-lw6hlp-about

`c-lw6hlp-about` [C function exported to Guile]
Wrapper on lw6hlp_about.

### 4.16.96 c-lw6hlp-get-default-value

`c-lw6hlp-get-default-value` [C function exported to Guile]
Wrapper on lw6hlp_get_default_value.

### 4.16.97 c-lw6hlp-list

`c-lw6hlp-list` [C function exported to Guile]
Wrapper on lw6hlp_list.

### 4.16.98 c-lw6hlp-list-advanced

`c-lw6hlp-list-advanced` [C function exported to Guile]
Wrapper on lw6hlp_list_advanced.

### 4.16.99 c-lw6hlp-list-aliases

`c-lw6hlp-list-aliases` [C function exported to Guile]
Wrapper on lw6hlp_list_aliases.

### 4.16.100 c-lw6hlp-list-doc

`c-lw6hlp-list-doc` [C function exported to Guile]
Wrapper on lw6hlp_list_doc.

### 4.16.101 c-lw6hlp-list-funcs

`c-lw6hlp-list-funcs` [C function exported to Guile]
Wrapper on lw6hlp_list_funcs.

### 4.16.102 c-lw6hlp-list-graphics

`c-lw6hlp-list-graphics` [C function exported to Guile]
Wrapper on lw6hlp_list_graphics.

### 4.16.103 c-lw6hlp-list-hooks

`c-lw6hlp-list-hooks` [C function exported to Guile]
Wrapper on lw6hlp_list_hooks.

### 4.16.104 c-lw6hlp-list-input

`c-lw6hlp-list-input` [C function exported to Guile]
Wrapper on lw6hlp_list_input.

### 4.16.105 c-lw6hlp-list-map

`c-lw6hlp-list-map` [C function exported to Guile]
Wrapper on lw6hlp_list_map.

### 4.16.106 c-lw6hlp-list-map-hints

`c-lw6hlp-list-map-hints` [C function exported to Guile]
Wrapper on lw6hlp_list_map_hints.

### 4.16.107 c-lw6hlp-list-map-rules

`c-lw6hlp-list-map-rules` [C function exported to Guile]
Wrapper on lw6hlp_list_map_rules.

### 4.16.108 c-lw6hlp-list-map-style

`c-lw6hlp-list-map-style` [C function exported to Guile]
Wrapper on lw6hlp_list_map_style.

### 4.16.109 c-lw6hlp-list-map-teams

`c-lw6hlp-list-map-teams` [C function exported to Guile]
Wrapper on lw6hlp_list_map_teams.

### 4.16.110 c-lw6hlp-list-network

`c-lw6hlp-list-network` [C function exported to Guile]
Wrapper on lw6hlp_list_network.

### 4.16.111 c-lw6hlp-list-path

`c-lw6hlp-list-path` [C function exported to Guile]
Wrapper on lw6hlp_list_path.

### 4.16.112 c-lw6hlp-list-players

`c-lw6hlp-list-players` [C function exported to Guile]
Wrapper on lw6hlp_list_players.

### 4.16.113 c-lw6hlp-list-quick

`c-lw6hlp-list-quick` [C function exported to Guile]
Wrapper on lw6hlp_list_quick.

### 4.16.114 c-lw6hlp-list-show

`c-lw6hlp-list-show` [C function exported to Guile]
Wrapper on lw6hlp_list_show.

### 4.16.115 c-lw6hlp-list-sound

`c-lw6hlp-list-sound` [C function exported to Guile]
Wrapper on lw6hlp_list_sound.

### 4.16.116 c-lw6hlp-list-team-colors

`c-lw6hlp-list-team-colors` [C function exported to Guile]
Wrapper on lw6hlp_list_team_colors.

### 4.16.117 c-lw6hlp-list-weapons

`c-lw6hlp-list-weapons` [C function exported to Guile]
Wrapper on lw6hlp_list_weapons.

### 4.16.118 c-lw6ker-add-cursor

`c-lw6ker-add-cursor` [C function exported to Guile]
Wrapper on lw6ker_add_cursor.

### 4.16.119 c-lw6ker-build-game-state

`c-lw6ker-build-game-state` [C function exported to Guile]
Wrapper on lw6ker_build_game_state.

### 4.16.120 c-lw6ker-build-game-struct

`c-lw6ker-build-game-struct` [C function exported to Guile]
Wrapper on lw6ker_build_game_struct.

### 4.16.121 c-lw6ker-cursor-exists

`c-lw6ker-cursor-exists` [C function exported to Guile]
Wrapper on lw6ker_cursor_exists.

### 4.16.122 c-lw6ker-did-cursor-win

`c-lw6ker-did-cursor-win` [C function exported to Guile]
Wrapper on lw6ker_did_cursor_win.

### 4.16.123 c-lw6ker-do-round

`c-lw6ker-do-round` [C function exported to Guile]
Wrapper on lw6ker_do_round.

### 4.16.124 c-lw6ker-dup-game-state

`c-lw6ker-dup-game-state` [C function exported to Guile]
Wrapper on lw6ker_dup_game_state.

### 4.16.125 c-lw6ker-game-state-checksum

`c-lw6ker-game-state-checksum` [C function exported to Guile]
Wrapper on lw6ker_game_state_checksum.

### 4.16.126 c-lw6ker-game-struct-checksum

`c-lw6ker-game-struct-checksum` [C function exported to Guile]
Wrapper on lw6ker_game_struct_checksum.

### 4.16.127 c-lw6ker-get-cursor

`c-lw6ker-get-cursor` [C function exported to Guile]
Wrapper on lw6ker_get_cursor.

### 4.16.128 c-lw6ker-get-moves

`c-lw6ker-get-moves` [C function exported to Guile]
Wrapper on lw6ker_get_moves.

### 4.16.129 c-lw6ker-get-rounds

`c-lw6ker-get-rounds` [C function exported to Guile]
Wrapper on lw6ker_get_rounds.

### 4.16.130 c-lw6ker-get-spreads

`c-lw6ker-get-spreads` [C function exported to Guile]
Wrapper on lw6ker_get_spreads.

### 4.16.131 c-lw6ker-is-over

`c-lw6ker-is-over` [C function exported to Guile]
Wrapper on lw6ker_is_over.

### 4.16.132 c-lw6ker-node-exists

`c-lw6ker-node-exists` [C function exported to Guile]
Wrapper on lw6ker_node_exists.

### 4.16.133 c-lw6ker-register-node

`c-lw6ker-register-node` [C function exported to Guile]
Wrapper on lw6ker_register_node.

### 4.16.134 c-lw6ker-remove-cursor

`c-lw6ker-remove-cursor` [C function exported to Guile]
Wrapper on lw6ker_remove_cursor.

### 4.16.135 c-lw6ker-set-cursor

`c-lw6ker-set-cursor` [C function exported to Guile]
Wrapper on lw6ker_set_cursor.

### 4.16.136 c-lw6ker-sync-game-state

`c-lw6ker-sync-game-state` [C function exported to Guile]
Wrapper on lw6ker_sync_game_state.

### 4.16.137 c-lw6ker-unregister-node

`c-lw6ker-unregister-node` [C function exported to Guile]
Wrapper on lw6ker_unregister_node.

### 4.16.138 c-lw6ldr-chain-entry

`c-lw6ldr-chain-entry` [C function exported to Guile]
Wrapper on lw6ldr_chain_entry.

### 4.16.139 c-lw6ldr-exp-validate

`c-lw6ldr-exp-validate` [C function exported to Guile]
Wrapper on lw6ldr_exp_validate.

### 4.16.140 c-lw6ldr-get-entries

`c-lw6ldr-get-entries` [C function exported to Guile]
Wrapper on lw6ldr_get_entries.

### 4.16.141 c-lw6ldr-hints-get-default

`c-lw6ldr-hints-get-default` [C function exported to Guile]
Wrapper on lw6ldr_hints_get_default.

### 4.16.142 c-lw6ldr-print-examples

`c-lw6ldr-print-examples` [C function exported to Guile]
Wrapper on lw6ldr_print_examples.

### 4.16.143 c-lw6ldr-read

`c-lw6ldr-read` [C function exported to Guile]
Wrapper on lw6ldr_read.

### 4.16.144 c-lw6ldr-read-relative

`c-lw6ldr-read-relative` [C function exported to Guile]
Wrapper on lw6ldr_read_relative.

### 4.16.145 c-lw6map-exp-get-unlocked-team-color

`c-lw6map-exp-get-unlocked-team-color` [C function exported to Guile]
Wrapper on lw6map_exp_get_unlocked_team_color.

### 4.16.146 c-lw6map-exp-get-unlocked-weapon

`c-lw6map-exp-get-unlocked-weapon` [C function exported to Guile]
Wrapper on lw6map_exp_get_unlocked_weapon.

### 4.16.147 c-lw6map-exp-is-team-color-allowed

`c-lw6map-exp-is-team-color-allowed` [C function exported to Guile]
Wrapper on lw6map_exp_is_team_color_allowed.

### 4.16.148 c-lw6map-exp-is-weapon-allowed

`c-lw6map-exp-is-weapon-allowed` [C function exported to Guile]
Wrapper on lw6map_exp_is_weapon_allowed.

### 4.16.149 c-lw6map-get-look

`c-lw6map-get-look` [C function exported to Guile]
Wrapper on lw6map_get_look.

### 4.16.150 c-lw6map-get-music-dir

`c-lw6map-get-music-dir` [C function exported to Guile]
Wrapper on lw6map_get_music_dir.

### 4.16.151 c-lw6map-param-get

`c-lw6map-param-get` [C function exported to Guile]
Wrapper on lw6map_param_get.

### 4.16.152 c-lw6map-rules-get-default

`c-lw6map-rules-get-default` [C function exported to Guile]
Wrapper on lw6map_rules_get_default.

### 4.16.153 c-lw6map-rules-get-int

`c-lw6map-rules-get-int` [C function exported to Guile]
Wrapper on lw6map_rules_get_int.

### 4.16.154 c-lw6map-rules-get-max

`c-lw6map-rules-get-max` [C function exported to Guile]
Wrapper on lw6map_rules_get_max.

### 4.16.155 c-lw6map-rules-get-min

`c-lw6map-rules-get-min` [C function exported to Guile]
Wrapper on lw6map_rules_get_min.

### 4.16.156 c-lw6map-style-get-default

`c-lw6map-style-get-default` [C function exported to Guile]
Wrapper on lw6map_style_get_default.

### 4.16.157 c-lw6map-team-color-index-to-key

`c-lw6map-team-color-index-to-key` [C function exported to Guile]
Wrapper on lw6map_team_color_index_to_key.

### 4.16.158 c-lw6map-team-color-index-to-label

`c-lw6map-team-color-index-to-label` [C function exported to Guile]
Wrapper on lw6map_team_color_index_to_label.

### 4.16.159 c-lw6map-team-color-key-to-index

`c-lw6map-team-color-key-to-index` [C function exported to Guile]
Wrapper on lw6map_team_color_key_to_index.

### 4.16.160 c-lw6map-team-color-list

`c-lw6map-team-color-list` [C function exported to Guile]
Wrapper on lw6map_team_color_list.

### 4.16.161 c-lw6map-teams-get-default

`c-lw6map-teams-get-default` [C function exported to Guile]
Wrapper on lw6map_teams_get_default.

### 4.16.162 c-lw6map-weapon-index-to-key

`c-lw6map-weapon-index-to-key` [C function exported to Guile]
Wrapper on lw6map_weapon_index_to_key.

### 4.16.163 c-lw6map-weapon-index-to-label

`c-lw6map-weapon-index-to-label` [C function exported to Guile]
Wrapper on lw6map_weapon_index_to_label.

### 4.16.164 c-lw6map-weapon-key-to-index

`c-lw6map-weapon-key-to-index` [C function exported to Guile]
Wrapper on lw6map_weapon_key_to_index.

### 4.16.165 c-lw6map-weapon-list

`c-lw6map-weapon-list` [C function exported to Guile]
Wrapper on lw6map_weapon_list.

### 4.16.166 c-lw6net-init

`c-lw6net-init` [C function exported to Guile]
Wrapper on lw6net_init.

### 4.16.167 c-lw6net-quit

`c-lw6net-quit` [C function exported to Guile]
Wrapper on lw6net_quit.

### 4.16.168 c-lw6p2p-db-default-name

`c-lw6p2p-db-default-name` [C function exported to Guile]
Wrapper on lw6p2p_db_default_name.

### 4.16.169 c-lw6p2p-db-new

`c-lw6p2p-db-new` [C function exported to Guile]
Wrapper on lw6p2p_db_new.

### 4.16.170 c-lw6p2p-db-reset

`c-lw6p2p-db-reset` [C function exported to Guile]
Wrapper on lw6p2p_db_reset.

### 4.16.171 c-lw6p2p-node-close

`c-lw6p2p-node-close` [C function exported to Guile]
Wrapper on lw6p2p_node_close.

### 4.16.172 c-lw6p2p-node-get-entries

`c-lw6p2p-node-get-entries` [C function exported to Guile]
Wrapper on lw6p2p_node_get_entries.

### 4.16.173 c-lw6p2p-node-get-id

`c-lw6p2p-node-get-id` [C function exported to Guile]
Wrapper on lw6p2p_node_get_id.

### 4.16.174 c-lw6p2p-node-new

`c-lw6p2p-node-new` [C function exported to Guile]
Wrapper on lw6p2p_node_new.

### 4.16.175 c-lw6p2p-node-poll

`c-lw6p2p-node-poll` [C function exported to Guile]
Wrapper on lw6p2p_node_poll.

### 4.16.176 c-lw6pil-bench

`c-lw6pil-bench` [C function exported to Guile]
Wrapper on lw6pil_bench.

### 4.16.177 c-lw6pil-build-pilot

`c-lw6pil-build-pilot` [C function exported to Guile]
Wrapper on lw6pil_build_pilot.

### 4.16.178 c-lw6pil-calibrate

`c-lw6pil-calibrate` [C function exported to Guile]
Wrapper on lw6pil_calibrate.

### 4.16.179 c-lw6pil-commit

`c-lw6pil-commit` [C function exported to Guile]
Wrapper on lw6pil_commit.

### 4.16.180 c-lw6pil-did-cursor-win

`c-lw6pil-did-cursor-win` [C function exported to Guile]
Wrapper on lw6pil_did_cursor_win.

### 4.16.181 c-lw6pil-execute-command

`c-lw6pil-execute-command` [C function exported to Guile]
Wrapper on lw6pil_execute_command.

### 4.16.182 c-lw6pil-fix-coords

`c-lw6pil-fix-coords` [C function exported to Guile]
Wrapper on lw6pil_coords_fix.

### 4.16.183 c-lw6pil-fix-coords-x10

`c-lw6pil-fix-coords-x10` [C function exported to Guile]
Wrapper on lw6pil_coords_fix_x10.

### 4.16.184 c-lw6pil-get-last-commit-seq

`c-lw6pil-get-last-commit-seq` [C function exported to Guile]
Wrapper on lw6pil_get_last_commit_seq.

### 4.16.185 c-lw6pil-get-looser

`c-lw6pil-get-looser` [C function exported to Guile]
Wrapper on lw6pil_get_looser.

### 4.16.186 c-lw6pil-get-max-seq

`c-lw6pil-get-max-seq` [C function exported to Guile]
Wrapper on lw6pil_get_max_seq.

### 4.16.187 c-lw6pil-get-next-seq

`c-lw6pil-get-next-seq` [C function exported to Guile]
Wrapper on lw6pil_get_next_seq.

### 4.16.188 c-lw6pil-get-reference-current-seq

`c-lw6pil-get-reference-current-seq` [C function exported to Guile]
Wrapper on lw6pil_get_reference_current_seq.

### 4.16.189 c-lw6pil-get-reference-target-seq

`c-lw6pil-get-reference-target-seq` [C function exported to Guile]
Wrapper on lw6pil_get_reference_target_seq.

### 4.16.190 c-lw6pil-get-winner

`c-lw6pil-get-winner` [C function exported to Guile]
Wrapper on lw6pil_get_winner.

### 4.16.191 c-lw6pil-is-over

`c-lw6pil-is-over` [C function exported to Guile]
Wrapper on lw6pil_is_over.

### 4.16.192 c-lw6pil-local-command

`c-lw6pil-local-command` [C function exported to Guile]
Wrapper on lw6pil_local_command.

### 4.16.193 c-lw6pil-local-cursors-set-main

`c-lw6pil-local-cursors-set-main` [C function exported to Guile]
Wrapper on lw6pil_local_cursors_set_main.

### 4.16.194 c-lw6pil-local-cursors-set-mouse-controlled

`c-lw6pil-local-cursors-set-mouse-controlled` [C function exported to Guile]
Wrapper on lw6pil_local_cursors_set_mouse_controlled.

### 4.16.195 c-lw6pil-make-backup

`c-lw6pil-make-backup` [C function exported to Guile]
Wrapper on lw6pil_make_backup.

### 4.16.196 c-lw6pil-send-command

`c-lw6pil-send-command` [C function exported to Guile]
Wrapper on lw6pil_send_command.

### 4.16.197 c-lw6pil-seq-random-0

`c-lw6pil-seq-random-0` [C function exported to Guile]
Wrapper on lw6pil_seq_random_0.

### 4.16.198 c-lw6pil-slow-down

`c-lw6pil-slow-down` [C function exported to Guile]
Wrapper on lw6pil_slow_down.

### 4.16.199 c-lw6pil-speed-up

`c-lw6pil-speed-up` [C function exported to Guile]
Wrapper on lw6pil_speed_up.

### 4.16.200 c-lw6pil-sync-from-backup

`c-lw6pil-sync-from-backup` [C function exported to Guile]
Wrapper on lw6pil_sync_from_backup.

### 4.16.201 c-lw6pil-sync-from-draft

`c-lw6pil-sync-from-draft` [C function exported to Guile]
Wrapper on lw6pil_sync_from_draft.

### 4.16.202 c-lw6pil-sync-from-reference

`c-lw6pil-sync-from-reference` [C function exported to Guile]
Wrapper on lw6pil_sync_from_reference.

### 4.16.203 c-lw6snd-get-backends

`c-lw6snd-get-backends` [C function exported to Guile]
Wrapper on lw6snd_get_backends.

### 4.16.204 c-lw6snd-is-music-file

`c-lw6snd-is-music-file` [C function exported to Guile]
Wrapper on lw6snd_is_music_file.

### 4.16.205 c-lw6snd-new

`c-lw6snd-new` [C function exported to Guile]
Wrapper on lw6snd_new.

### 4.16.206 c-lw6snd-play-fx

`c-lw6snd-play-fx` [C function exported to Guile]
Wrapper on lw6snd_play_fx.

### 4.16.207 c-lw6snd-play-music-file

`c-lw6snd-play-music-file` [C function exported to Guile]
Wrapper on lw6snd_play_music_file.

### 4.16.208 c-lw6snd-play-music-random

`c-lw6snd-play-music-random` [C function exported to Guile]
Wrapper on lw6snd_play_music_random.

### 4.16.209 c-lw6snd-poll

`c-lw6snd-poll` [C function exported to Guile]
Wrapper on lw6snd_poll.

### 4.16.210 c-lw6snd-release

`c-lw6snd-release` [C function exported to Guile]
Wrapper on lw6snd_release.

### 4.16.211 c-lw6snd-set-fx-volume

`c-lw6snd-set-fx-volume` [C function exported to Guile]
Wrapper on lw6snd_set_fx_volume.

### 4.16.212 c-lw6snd-set-music-volume

`c-lw6snd-set-music-volume` [C function exported to Guile]
Wrapper on lw6snd_set_music_volume.

### 4.16.213 c-lw6snd-set-water-volume

`c-lw6snd-set-water-volume` [C function exported to Guile]
Wrapper on lw6snd_set_water_volume.

### 4.16.214 c-lw6snd-stop-music

`c-lw6snd-stop-music` [C function exported to Guile]
Wrapper on lw6snd_stop_music.

### 4.16.215 c-lw6srv-get-backends

`c-lw6srv-get-backends` [C function exported to Guile]
Wrapper on lw6srv_get_backends.

### 4.16.216 c-lw6sys-build-get-bin-id

`c-lw6sys-build-get-bin-id` [C function exported to Guile]
Wrapper on lw6sys_build_get_bin_id.

### 4.16.217 c-lw6sys-build-get-bugs-url

`c-lw6sys-build-get-bugs-url` [C function exported to Guile]
Wrapper on lw6sys_build_get_bugs_url.

### 4.16.218 c-lw6sys-build-get-cflags

`c-lw6sys-build-get-cflags` [C function exported to Guile]
Wrapper on lw6sys_build_get_cflags.

### 4.16.219 c-lw6sys-build-get-codename

`c-lw6sys-build-get-codename` [C function exported to Guile]
Wrapper on lw6sys_build_get_codename.

### 4.16.220 c-lw6sys-build-get-configure-args

`c-lw6sys-build-get-configure-args` [C function exported to Guile]
Wrapper on lw6sys_build_get_configure_args.

### 4.16.221 c-lw6sys-build-get-copyright

`c-lw6sys-build-get-copyright` [C function exported to Guile]
Wrapper on lw6sys_build_get_copyright.

### 4.16.222 c-lw6sys-build-get-datadir

`c-lw6sys-build-get-datadir` [C function exported to Guile]
Wrapper on lw6sys_build_get_datadir.

### 4.16.223 c-lw6sys-build-get-date

`c-lw6sys-build-get-date` [C function exported to Guile]
Wrapper on lw6sys_build_get_date.

### 4.16.224 c-lw6sys-build-get-enable-allinone

`c-lw6sys-build-get-enable-allinone` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_allinone.

### 4.16.225 c-lw6sys-build-get-enable-console

`c-lw6sys-build-get-enable-console` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_console.

### 4.16.226 c-lw6sys-build-get-enable-fullstatic

`c-lw6sys-build-get-enable-fullstatic` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_fullstatic.

### 4.16.227 c-lw6sys-build-get-enable-gcov

`c-lw6sys-build-get-enable-gcov` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_gcov.

### 4.16.228 c-lw6sys-build-get-enable-gprof

`c-lw6sys-build-get-enable-gprof` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_gprof.

### 4.16.229 c-lw6sys-build-get-enable-gtk

`c-lw6sys-build-get-enable-gtk` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_gtk.

### 4.16.230 c-lw6sys-build-get-enable-instrument

`c-lw6sys-build-get-enable-instrument` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_instrument.

### 4.16.231 c-lw6sys-build-get-enable-mod-csound

`c-lw6sys-build-get-enable-mod-csound` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_mod_csound.

### 4.16.232 c-lw6sys-build-get-enable-mod-gl

`c-lw6sys-build-get-enable-mod-gl` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_mod_gl.

### 4.16.233 c-lw6sys-build-get-enable-mod-http

`c-lw6sys-build-get-enable-mod-http` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_mod_http.

### 4.16.234 c-lw6sys-build-get-enable-mod-ogg

`c-lw6sys-build-get-enable-mod-ogg` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_mod_ogg.

### 4.16.235 c-lw6sys-build-get-enable-openmp

`c-lw6sys-build-get-enable-openmp` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_openmp.

### 4.16.236 c-lw6sys-build-get-enable-optimize

`c-lw6sys-build-get-enable-optimize` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_optimize.

### 4.16.237 c-lw6sys-build-get-enable-paranoid

`c-lw6sys-build-get-enable-paranoid` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_paranoid.

### 4.16.238 c-lw6sys-build-get-enable-profiler

`c-lw6sys-build-get-enable-profiler` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_profiler.

### 4.16.239 c-lw6sys-build-get-enable-valgrind

`c-lw6sys-build-get-enable-valgrind` [C function exported to Guile]
Wrapper on lw6sys_build_get_enable_valgrind.

### 4.16.240 c-lw6sys-build-get-endianness

`c-lw6sys-build-get-endianness` [C function exported to Guile]
Wrapper on lw6sys_build_get_endianness.

### 4.16.241 c-lw6sys-build-get-gcc-version

`c-lw6sys-build-get-gcc-version` [C function exported to Guile]
Wrapper on lw6sys_build_get_gcc_version.

### 4.16.242 c-lw6sys-build-get-home-url

`c-lw6sys-build-get-home-url` [C function exported to Guile]
Wrapper on lw6sys_build_get_home_url.

### 4.16.243 c-lw6sys-build-get-host-cpu

`c-lw6sys-build-get-host-cpu` [C function exported to Guile]
Wrapper on lw6sys_build_get_host_cpu.

### 4.16.244 c-lw6sys-build-get-host-os

`c-lw6sys-build-get-host-os` [C function exported to Guile]
Wrapper on lw6sys_build_get_host_os.

### 4.16.245 c-lw6sys-build-get-hostname

`c-lw6sys-build-get-hostname` [C function exported to Guile]
Wrapper on lw6sys_build_get_hostname.

### 4.16.246 c-lw6sys-build-get-includedir

`c-lw6sys-build-get-includedir` [C function exported to Guile]
Wrapper on lw6sys_build_get_includedir.

### 4.16.247 c-lw6sys-build-get-ldflags

`c-lw6sys-build-get-ldflags` [C function exported to Guile]
Wrapper on lw6sys_build_get_ldflags.

### 4.16.248 c-lw6sys-build-get-libdir

`c-lw6sys-build-get-libdir` [C function exported to Guile]
Wrapper on lw6sys_build_get_libdir.

### 4.16.249 c-lw6sys-build-get-license

`c-lw6sys-build-get-license` [C function exported to Guile]
Wrapper on lw6sys_build_get_license.

### 4.16.250 c-lw6sys-build-get-localedir

`c-lw6sys-build-get-localedir` [C function exported to Guile]
Wrapper on lw6sys_build_get_localedir.

### 4.16.251 c-lw6sys-build-get-md5sum

`c-lw6sys-build-get-md5sum` [C function exported to Guile]
Wrapper on lw6sys_build_get_md5sum.

### 4.16.252 c-lw6sys-build-get-package-name

`c-lw6sys-build-get-package-name` [C function exported to Guile]
Wrapper on lw6sys_build_get_package_name.

### 4.16.253 c-lw6sys-build-get-package-string

`c-lw6sys-build-get-package-string` [C function exported to Guile]
Wrapper on lw6sys_build_get_package_string.

### 4.16.254 c-lw6sys-build-get-package-tarname

`c-lw6sys-build-get-package-tarname` [C function exported to Guile]
Wrapper on lw6sys_build_get_package_tarname.

### 4.16.255 c-lw6sys-build-get-pointer-size

`c-lw6sys-build-get-pointer-size` [C function exported to Guile]
Wrapper on lw6sys_build_get_pointer_size.

### 4.16.256 c-lw6sys-build-get-prefix

`c-lw6sys-build-get-prefix` [C function exported to Guile]
Wrapper on lw6sys_build_get_prefix.

### 4.16.257 c-lw6sys-build-get-stamp

`c-lw6sys-build-get-stamp` [C function exported to Guile]
Wrapper on lw6sys_build_get_stamp.

### 4.16.258 c-lw6sys-build-get-time

`c-lw6sys-build-get-time` [C function exported to Guile]
Wrapper on lw6sys_build_get_time.

### 4.16.259 c-lw6sys-build-get-top-srcdir

`c-lw6sys-build-get-top-srcdir` [C function exported to Guile]
Wrapper on lw6sys_build_get_top_srcdir.

### 4.16.260 c-lw6sys-build-get-version

`c-lw6sys-build-get-version` [C function exported to Guile]
Wrapper on lw6sys_build_get_version.

### 4.16.261 c-lw6sys-build-is-gnu

`c-lw6sys-build-is-gnu` [C function exported to Guile]
Wrapper on lw6sys_build_is_gnu.

### 4.16.262 c-lw6sys-build-is-gp2x

`c-lw6sys-build-is-gp2x` [C function exported to Guile]
Wrapper on lw6sys_build_is_gp2x.

### 4.16.263 c-lw6sys-build-is-mac-os-x

`c-lw6sys-build-is-mac-os-x` [C function exported to Guile]
Wrapper on lw6sys_build_is_mac_os_x.

### 4.16.264 c-lw6sys-build-is-ms-windows

`c-lw6sys-build-is-ms-windows` [C function exported to Guile]
Wrapper on lw6sys_build_is_ms_windows.

### 4.16.265 c-lw6sys-build-is-unix

`c-lw6sys-build-is-unix` [C function exported to Guile]
Wrapper on lw6sys_build_is_unix.

### 4.16.266 c-lw6sys-build-is-x86

`c-lw6sys-build-is-x86` [C function exported to Guile]
Wrapper on lw6sys_build_is_x86.

### 4.16.267 c-lw6sys-debug-get

`c-lw6sys-debug-get` [C function exported to Guile]
Wrapper on lw6sys_debug_get.

### 4.16.268 c-lw6sys-debug-set

`c-lw6sys-debug-set` [C function exported to Guile]
Wrapper on lw6sys_debug_set.

### 4.16.269 c-lw6sys-delay

`c-lw6sys-delay` [C function exported to Guile]
Wrapper on lw6sys_delay.

### 4.16.270 c-lw6sys-dump

`c-lw6sys-dump` [C function exported to Guile]
Wrapper on lw6sys_dump.

### 4.16.271 c-lw6sys-dump-clear

`c-lw6sys-dump-clear` [C function exported to Guile]
Wrapper on lw6sys_dump_clear.

### 4.16.272 c-lw6sys-generate-id-16

`c-lw6sys-generate-id-16` [C function exported to Guile]
Wrapper on lw6sys_generate_id_16.

### 4.16.273 c-lw6sys-generate-id-32

`c-lw6sys-generate-id-32` [C function exported to Guile]
Wrapper on lw6sys_generate_id_32.

### 4.16.274 c-lw6sys-generate-id-64

`c-lw6sys-generate-id-64` [C function exported to Guile]
Wrapper on lw6sys_generate_id_64.

### 4.16.275 c-lw6sys-get-config-file

`c-lw6sys-get-config-file` [C function exported to Guile]
Wrapper on lw6sys_get_config_file.

### 4.16.276 c-lw6sys-get-cwd

`c-lw6sys-get-cwd` [C function exported to Guile]
Wrapper on lw6sys_get_cwd.

### 4.16.277 c-lw6sys-get-cycle

`c-lw6sys-get-cycle` [C function exported to Guile]
Wrapper on lw6sys_get_cycle.

### 4.16.278 c-lw6sys-get-data-dir

`c-lw6sys-get-data-dir` [C function exported to Guile]
Wrapper on lw6sys_get_data_dir.

### 4.16.279 c-lw6sys-get-default-config-file

`c-lw6sys-get-default-config-file` [C function exported to Guile]
Wrapper on lw6sys_get_default_config_file.

### 4.16.280 c-lw6sys-get-default-data-dir

`c-lw6sys-get-default-data-dir` [C function exported to Guile]
Wrapper on lw6sys_get_default_data_dir.

### 4.16.281 c-lw6sys-get-default-log-file

`c-lw6sys-get-default-log-file` [C function exported to Guile]
Wrapper on lw6sys_get_default_log_file.

### 4.16.282 c-lw6sys-get-default-map-dir

`c-lw6sys-get-default-map-dir` [C function exported to Guile]
Wrapper on lw6sys_get_default_map_dir.

### 4.16.283 c-lw6sys-get-default-map-path

`c-lw6sys-get-default-map-path` [C function exported to Guile]
Wrapper on lw6sys_get_default_map_path.

### 4.16.284 c-lw6sys-get-default-mod-dir

`c-lw6sys-get-default-mod-dir` [C function exported to Guile]
Wrapper on lw6sys_get_default_mod_dir.

### 4.16.285 c-lw6sys-get-default-music-dir

`c-lw6sys-get-default-music-dir` [C function exported to Guile]
Wrapper on lw6sys_get_default_music_dir.

### 4.16.286 c-lw6sys-get-default-music-path

`c-lw6sys-get-default-music-path` [C function exported to Guile]
Wrapper on lw6sys_get_default_music_path.

### 4.16.287 c-lw6sys-get-default-prefix

`c-lw6sys-get-default-prefix` [C function exported to Guile]
Wrapper on lw6sys_get_default_prefix.

### 4.16.288 c-lw6sys-get-default-script-file

`c-lw6sys-get-default-script-file` [C function exported to Guile]
Wrapper on lw6sys_get_default_script_file.

### 4.16.289 c-lw6sys-get-default-user-dir

`c-lw6sys-get-default-user-dir` [C function exported to Guile]
Wrapper on lw6sys_get_default_user_dir.

### 4.16.290 c-lw6sys-get-hostname

`c-lw6sys-get-hostname` [C function exported to Guile]
Wrapper on lw6sys_get_hostname.

### 4.16.291 c-lw6sys-get-log-file

`c-lw6sys-get-log-file` [C function exported to Guile]
Wrapper on lw6sys_get_log_file.

### 4.16.292 c-lw6sys-get-map-dir

`c-lw6sys-get-map-dir` [C function exported to Guile]
Wrapper on lw6sys_get_map_dir.

### 4.16.293 c-lw6sys-get-map-path

`c-lw6sys-get-map-path` [C function exported to Guile]
Wrapper on lw6sys_get_map_path.

### 4.16.294 c-lw6sys-get-mod-dir

`c-lw6sys-get-mod-dir` [C function exported to Guile]
Wrapper on lw6sys_get_mod_dir.

### 4.16.295 c-lw6sys-get-music-dir

`c-lw6sys-get-music-dir` [C function exported to Guile]
Wrapper on lw6sys_get_music_dir.

### 4.16.296 c-lw6sys-get-music-path

`c-lw6sys-get-music-path` [C function exported to Guile]
Wrapper on lw6sys_get_music_path.

### 4.16.297 c-lw6sys-get-prefix

`c-lw6sys-get-prefix` [C function exported to Guile]
Wrapper on lw6sys_get_prefix.

### 4.16.298 c-lw6sys-get-run-dir

`c-lw6sys-get-run-dir` [C function exported to Guile]
Wrapper on lw6sys_get_run_dir.

### 4.16.299 c-lw6sys-get-script-file

`c-lw6sys-get-script-file` [C function exported to Guile]
Wrapper on lw6sys_get_script_file.

### 4.16.300 c-lw6sys-get-timestamp

`c-lw6sys-get-timestamp` [C function exported to Guile]
Wrapper on lw6sys_get_timestamp.

### 4.16.301 c-lw6sys-get-uptime

`c-lw6sys-get-uptime` [C function exported to Guile]
Wrapper on lw6sys_get_uptime.

### 4.16.302 c-lw6sys-get-user-dir

`c-lw6sys-get-user-dir` [C function exported to Guile]
Wrapper on lw6sys_get_user_dir.

### 4.16.303 c-lw6sys-get-username

`c-lw6sys-get-username` [C function exported to Guile]
Wrapper on lw6sys_get_username.

### 4.16.304 c-lw6sys-getenv

`c-lw6sys-getenv` [C function exported to Guile]
Wrapper on lw6sys_getenv.

### 4.16.305 c-lw6sys-getenv-prefixed

`c-lw6sys-getenv-prefixed` [C function exported to Guile]
Wrapper on lw6sys_getenv_prefixed.

### 4.16.306 c-lw6sys-idle

`c-lw6sys-idle` [C function exported to Guile]
Wrapper on lw6sys_idle.

### 4.16.307 c-lw6sys-log

`c-lw6sys-log` [C function exported to Guile]
Wrapper on lw6sys_log.

### 4.16.308 c-lw6sys-log-get-level

`c-lw6sys-log-get-level` [C function exported to Guile]
Wrapper on lw6sys_log_get_level.

### 4.16.309 c-lw6sys-log-set-level

`c-lw6sys-log-set-level` [C function exported to Guile]
Wrapper on lw6sys_log_set_level.

### 4.16.310 c-lw6sys-megabytes-available

`c-lw6sys-megabytes-available` [C function exported to Guile]
Wrapper on lw6sys_megabytes_available.

### 4.16.311 c-lw6sys-openmp-get-num-procs

`c-lw6sys-openmp-get-num-procs` [C function exported to Guile]
Wrapper on lw6sys_openmp_get_num_procs.

### 4.16.312 c-lw6sys-path-concat

`c-lw6sys-path-concat` [C function exported to Guile]
Wrapper on lw6sys_path_concat.

### 4.16.313 c-lw6sys-path-file-only

`c-lw6sys-path-file-only` [C function exported to Guile]
Wrapper on lw6sys_path_file_only.

### 4.16.314 c-lw6sys-path-parent

`c-lw6sys-path-parent` [C function exported to Guile]
Wrapper on lw6sys_path_parent.

### 4.16.315 c-lw6sys-path-split

`c-lw6sys-path-split` [C function exported to Guile]
Wrapper on lw6sys_path_split.

### 4.16.316 c-lw6sys-set-memory-bazooka-eraser

`c-lw6sys-set-memory-bazooka-eraser` [C function exported to Guile]
Wrapper on lw6sys_set_memory_bazooka_eraser.

### 4.16.317 c-lw6sys-set-memory-bazooka-size

`c-lw6sys-set-memory-bazooka-size` [C function exported to Guile]
Wrapper on lw6sys_set_memory_bazooka_size.

### 4.16.318 c-lw6sys-signal-custom

`c-lw6sys-signal-custom` [C function exported to Guile]
Wrapper on lw6sys_signal_custom.

### 4.16.319 c-lw6sys-signal-default

`c-lw6sys-signal-default` [C function exported to Guile]
Wrapper on lw6sys_signal_default.

### 4.16.320 c-lw6sys-signal-poll-quit

`c-lw6sys-signal-poll-quit` [C function exported to Guile]
Wrapper on lw6sys_signal_poll_quit.

### 4.16.321 c-lw6sys-signal-send-quit

`c-lw6sys-signal-send-quit` [C function exported to Guile]
Wrapper on lw6sys_signal_send_quit.

### 4.16.322 c-lw6sys-sleep

`c-lw6sys-sleep` [C function exported to Guile]
Wrapper on lw6sys_sleep.

### 4.16.323 c-lw6sys-snooze

`c-lw6sys-snooze` [C function exported to Guile]
Wrapper on lw6sys_snooze.

### 4.16.324 c-lw6sys-url-canonize

`c-lw6sys-url-canonize` [C function exported to Guile]
Wrapper on lw6sys_url_canonize.

### 4.16.325 c-lw6tsk-loader-get-stage

`c-lw6tsk-loader-get-stage` [C function exported to Guile]
Wrapper on lw6tsk_loader_get_stage.

### 4.16.326 c-lw6tsk-loader-new

`c-lw6tsk-loader-new` [C function exported to Guile]
Wrapper on lw6tsk_loader_new.

### 4.16.327 c-lw6tsk-loader-pop

`c-lw6tsk-loader-pop` [C function exported to Guile]
Wrapper on lw6tsk_loader_pop.

### 4.16.328 c-lw6tsk-loader-push

`c-lw6tsk-loader-push` [C function exported to Guile]
Wrapper on lw6tsk_loader_push.

## 4.17 Script hooks

# 5 C API

This chapter contains a description of all modules and a list of all documented C functions in the program. It contains many references and is self-generated from C comments using gdoc by Simon Josefsson.

In order to reduce the number of pages of printed output, this complete reference is, by default, disabled in printable versions of the documentation (PostScript, PDF). This is both to make the manual more readable and to avoid wasting paper. Think about the environment.

It is however available in the HTML version of the documentation, which you can read online on http://www.gnu.org/software/liquidwar6/manual/html_node/.

Additionnally, the following adresses contain various view on the source code, giving informations on all the internal and public C interfaces:

- http://www.gnu.org/software/liquidwar6/coverage/: the lcov output when running `./liquidwar6 --test`. It shows what functions are actually tested, and how many times they are called.
- http://www.gnu.org/software/liquidwar6/global/: the GNU global output gives complete cross-references, macros, headers, contants declaration. It's a very good place to start browsing the code.
- http://www.gnu.org/software/liquidwar6/cyclo/: the pmccabe output shows the cyclomatic complexity of functions. It enables the programmer to spots the "ugly" and dangerous parts of the program.

## 5.1 libliquidwar6

### 5.1.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/index.html.

### 5.1.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libliquidwar6.html.

## 5.2 libbot

### 5.2.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/bot/index.html.

### 5.2.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libbot.html.

## 5.3 mod-brute

### 5.3.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/bot/mod-brute/index.html.

### 5.3.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dbrute.html.

## 5.4 mod-follow

### 5.4.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/bot/mod-follow/index.html.

### 5.4.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dfollow.html.

## 5.5 mod-idiot

### 5.5.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/bot/mod-idiot/index.html.

### 5.5.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002didiot.html.

## 5.6 mod-random

### 5.6.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/bot/mod-random/index.html.

### 5.6.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002drandom.html.

## 5.7 libcfg

### 5.7.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/cfg/index.html.

### 5.7.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libcfg.html.

## 5.8 libcli

### 5.8.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/cli/index.html.

### 5.8.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libcli.html.

## 5.9 mod-http

### 5.9.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/cli/mod-http/index.html.

### 5.9.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dhttp.html.

## 5.10 mod-tcp

### 5.10.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/cli/mod-tcp/index.html.

### 5.10.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dtcp.html.

## 5.11 mod-udp

### 5.11.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/cli/mod-udp/index.html.

### 5.11.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dudp.html.

## 5.12 libcns

### 5.12.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/cns/index.html.

### 5.12.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libcns.html.

## 5.13 libcnx

### 5.13.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/cnx/index.html.

### 5.13.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libcnx.html.

## 5.14 libdat

### 5.14.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/dat/index.html.

### 5.14.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libdat.html.

## 5.15 libdef

### 5.15.1 Overview

### 5.15.2 API

There are no functions in `libdef`, only a header file with constants.

## 5.16 libdsp

### 5.16.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/dsp/index.html.

### 5.16.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libdsp.html.

## 5.17 libdyn

### 5.17.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/dyn/index.html.

### 5.17.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libdyn.html.

## 5.18 libgfx

### 5.18.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/gfx/index.html.

### 5.18.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libgfx.html.

## 5.19 mod-gl

### 5.19.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/gfx/mod-gl/gl-utils/index.html (as there are many sub-directories in this module, please refer to the test coverage directory index for complete information).

### 5.19.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dgl.html.

## 5.20 libglb

### 5.20.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/glb/index.html.

### 5.20.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libglb.html.

## 5.21 libgui

### 5.21.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/gui/index.html.

### 5.21.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libgui.html.

## 5.22 libhlp

### 5.22.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/hlp/index.html.

### 5.22.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libhlp.html.

## 5.23 libimg

### 5.23.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/img/index.html.

### 5.23.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libimg.html.

## 5.24 libker

### 5.24.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/ker/index.html.

### 5.24.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libker.html.

## 5.25 libldr

### 5.25.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/ldr/index.html.

### 5.25.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libldr.html.

## 5.26 libmap

### 5.26.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/map/index.html.

### 5.26.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libmap.html.

## 5.27 libmsg

### 5.27.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/msg/index.html.

### 5.27.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libmsg.html.

## 5.28 libnet

### 5.28.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/net/index.html.

### 5.28.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libnet.html.

## 5.29 libnod

### 5.29.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/nod/index.html.

### 5.29.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libnod.html.

## 5.30 libp2p

### 5.30.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/p2p/index.html.

### 5.30.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libp2p.html.

## 5.31 libpil

### 5.31.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/pil/index.html.

### 5.31.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libpil.html.

## 5.32 libscm

### 5.32.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/scm/index.html.

### 5.32.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libscm.html.

## 5.33 libsim

### 5.33.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/sim/index.html.

### 5.33.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libsim.html.

## 5.34 libsnd

### 5.34.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/snd/index.html.

### 5.34.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libsnd.html.

## 5.35 mod-csound

### 5.35.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/snd/mod-csound/index.html.

### 5.35.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dcsound.html.

## 5.36 mod-ogg

### 5.36.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/snd/mod-ogg/index.html.

### 5.36.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dogg.html.

## 5.37 libsrv

### 5.37.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/srv/index.html.

### 5.37.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libsrv.html.

## 5.38 mod-httpd

### 5.38.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/srv/mod-httpd/index.html.

### 5.38.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dhttpd.html.

## 5.39 mod-tcpd

### 5.39.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/srv/mod-tcpd/index.html.

### 5.39.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dtcpd.html.

## 5.40 mod-udpd

### 5.40.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/srv/mod-udpd/index.html.

### 5.40.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/mod_002dudpd.html.

## 5.41 libsys

### 5.41.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/sys/index.html.

### 5.41.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libsys.html.

## 5.42 libtsk

### 5.42.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/tsk/index.html.

### 5.42.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libtsk.html.

## 5.43 libvox

### 5.43.1 Overview

View lcov test coverage results on http://www.gnu.org/software/liquidwar6/coverage/src/lib/vox/index.html.

### 5.43.2 API

Online gdoc reference available on http://www.gnu.org/software/liquidwar6/manual/html_node/libvox.html.

# Appendix A 2005 .plan

Here's my .plan file, which describes what I (Christian Mauduit) have planned for Liquid War 6. There's no garantee that what's written here is a precise description of the real future, however it should give a good idea of what I have in mind.

Note that the information here was written in summer 2005, it might or not be accurate now, as the main reason for plans to exist is that people never follow them. I'm no exception.

## A.1 Complete rewrite

Liquid War 6 will be an almost complete rewrite. I mean that common code between branches 5 and 6 might end up in representing 0% of the total code. I think this is a wise decision, for the current code is really hard to maintain, and would not survive any serious cleanup. LW5 was first written in 1998, for DOS, when I had much less experience in programming. In 7 years I - and other people as well - hacked major enhancements in it such as cross-platform support, network games, and if you compare release 5.0 with the latest 5.x.x release, you'll see that a bunch of things have changed. I had never expected I would patch and fix this game for so long, and it's no surprise that it's bloated today.

FYI, here's a list of what makes LW5 unsuitable for major improvements without a complete rewrite:

- global variable hell. Lots of things are stored in globals.
- hard-coded C GUI. Read src/level.c to get an idea of how horrible it is.
- hard-coded 256 colors paletted mode. A clever bet in 1998 (performance...). Not anymore.
- generally bloated code. Makes bug-finding very tricky.

## A.2 Technologies

Liquid War 6 will use a different technical framework than Liquid War 5.

### A.2.1 Script + standard C + assembly

It happens that coding a large project in pure C is a waist of time, if possible at all.

If one applies the standard 80/20 rule to a computer game, one might state that 80% of the code eat up 20% of the CPU and the other 20% of the code eat up 80% of the CPU, the former being high-level glue code and the latter being low-level algorithmic code.

With Liquid War, one could speak of the 99/01 rule. I mean that 99% of the CPU time concerns only 1% of the code, and vice-versa. Basically, Liquid War has a very CPU-greedy core algorithm, still spends a fair amount of CPU displaying stuff (but this is delegated to the low-level game programming library) and the rest is totally unsignificant, in terms of CPU. Point is this "rest" represents the vast majority of the code, and also represents the very same buggy code I spend nights to patch on Liquid War 5. I'm talking about network code, GUI, and other high-level glue-code which are currently being written in C.

This idea is to write all this in a convenient scripting language. There won't be any impact on performances. I can't garantee Liquid War 6 will be blazingly fast, but for sure it won't be the scripting language fault. And of course if, as in Liquid War 3 and 5, I feel the need to implement some stuff in assembly for performances issues, I will do it.

We end up with a multi-language architecture: script + C + assembly.

My guess is that I'll use Scheme as an extension language. Python would be a good choice too. Let's say I'll give Scheme a chance, and if it's really not adapted, I'll switch back to Python. The point is that today I know Python and don't really know Scheme, but, well, it's always a pleasure for me to learn new things. It's fun.

So what is planned today is that Liquid War 6 will be a Scheme program, which will call callbacks functions written in C and/or assembly. These functions will do all the low-level time consuming algorithmic and graphical stuff. The rest of the code being entirely scripted.

### A.2.2 OpenGL

Liquid War is not a 3D game, so why use OpenGL?

- it's a very convenient way to access video hardware acceleration with XFree86.
- low-end computers and/or computers without 3D acceleration can still run Liquid War 5.
- I'm interested in learning/using this API 8-)

This choice implies that I won't use Allegro anymore. Allegro stays a very convenient library and I would recommend it for it's excellent, easy to learn, powerfull, and stable. But for the needs of Liquid War 6 I'll use something else (because of OpenGL). I first thought of using GLUT but I might end up simply using SDL. The idea is just fo have an OpenGL wrapper which sets up OpenGL in a similar manner on all platforms, and handles basic things such as mouse or keyboard.

### A.2.3 CSound

I've got two excellent books on Csound, and the will to learn how to use this tool.

I'll probably use Csound for a number of things, ranging from "bubbling sounds" to full blown music. Stay tuned 8-)

## A.3 Functionnalities

### A.3.1 Visual enhancements

Of course Liquid War 6 will look nicer than Liquid War 5, blah blah blah. What do you think?

Maybe I'll try to use some OpenGL features to make it possible to play on a ball, on a Moebius ring, or other fancy things. I have zillion of ideas, future will decide which ones will be implemented first.

To make it clear, visual enhancements aren't my top-level priority. However I'll try and make room for these enhancements, and prepare the terrain correctly. So it's possible that the first releases of Liquid War 6 won't be that much better than Liquid War 5, but at least Liquid War 6 will have the possibility to evolve. Something Liquid War 5 doesn't have.

### A.3.2 Rules enhancements

There are many things that could be done easily:

- several cursors for one team

- alliances between teams
- deep places on a map, where more liquid can reside
- circular maps which "connect" the left border to the right one
- ...

As for graphical improvements, this is not my top-level priority. Simply, I'll make the game ready-to-improve. Again, all these enhancements are very hard to code in Liquid War 5, else I would already have coded them. Network enhancements

That's my top-level prioriry.

Why is that? Well, think of Liquid War in terms of "what makes it a good game?" and "what makes it a poor game?".

It's a good game because:

- the idea is original
- the gameplay is addictive
- you can play on a LAN
- all the family can play
- it's cross-platform
- it's Free Software

It's a poor game because:

- it's somewhat ugly and has a retro "back in the eighties" look
- network games are slow on Internet
- there are not enough active Internet servers

For the ugliness, well, OpenGL and some artwork should make it. But for the network, what's the real problem?

The real problem is that in the current situation, the server needs to have all "keystrokes" before doing anything, and all players must be connected before a game starts. Here's what I plan to do to fix this:

- players will be able to connect on a game "on the fly". This is done by most online games, and it's IMHO a required features for a network mode to work on Internet (not speaking of local networks, but real wide online gaming). How this will fit with Liquid War's rules is not totally decided, but I already know of several way to achieve this.
- I'll implement an "anticipation" system "a la" U61. This means that no matter if a remote player has a poor network connection, things will behave as if everything was fine. Internally, the system keeps 2 images of the game. One which is "anticipated" and displayed to the player, and one which is validated but outdated, kept internally. It's a little hard to explain, consumes twice as much CPU and memory, but it works. It happens that today the lacking ressource for playing Liquid War online is more on the network side than on the local CPU and memory aspects.
- I'll take it to the next level and implement a "peer-to-peer-like" network model, in which any client can become a server. The idea behind is that if a server quits the game, then a client takes its role, letting the game continue for hours. This way one could virtually have a never ending Liquid War game which would last weeks. I believe

this could be really cool. I also believe no proprietary game will ever implement that, for in this model there's no way to force people to access a centralized server, this server usually being the major key in the business model of a company which sells proprietary software.

This third point will be the real enhancement of Liquid War with version 6. It's one of the very points which drives me to rewrite it completely. First because it's impossible to implement it without some heavy work. Then because I find it very motivating.

### A.3.3 Hey, you forgot my idea!!!

Many gamers submitted suggestions, either by mail or by posting messages on the mailing list.

Don't worry, I keep them. Not reading them here does not mean I won't implement them. It simply means I won't implement them first. I first need the game basically function before enhancing it with fancy stuff.

## A.4 Road map

As I stated on the mailing list, when thinking about Liquid War 6, think of years rather than months (unless I get fired, jobless, or spend several months in a hospital with a laptop).

Note that this road map takes it for granted that I'll be the lone coder on the project. It's unlikely that someone is going to help me for the first stages, until there's at least something real, something playable. Something that proves that the concept is valid. Besides, (real) team work implies a significant overhead, especially at project start. It's hard to figure out how to distribute tasks when the tasks themselves are not clearly identified. But for the rest (starting in 2007 or 2008), it's possible that external help might greatly... ...help!

- 2005 : Project framework should be done. This implies that the scripting engine is up and running, graphical mode works, config and data loading work, basic menus are available. Nothing playable.
- 2006 : Import the core algorithm from Liquid War 5, make the game playable in "demo mode" (" la" Liquid War 2), implement the network "peer-to-peer-like" mode. At this stage, it will be possible to know wether Liquid War 6 is true vaporware or not.
- 2007 : glue all this together to make something usable by anyone, heavy work on the GUI, on the options, on error checking, many bug fixes. The goal is to have a game which is equivalent to Liquid War 5, with the network aspects pushed to the next level.
- 2008 : tadaaaaaaaaaaa! Release the game "publicly" - inform Freecode 8-) - and enhance it with all the feedback from gamers (bug reports and suggestions received since 1998). Work on artwork (both graphics and musics). Write documentation.
- 2009 : stabilize the game, patch it for all those things which had been forgotten back then in 2005, optimize for speed, bug-fix bug-fix bug-fix.
- 2010 : stop maintaining Liquid War 5, invite Liquid War fans and coders to a hudge party in my garden, sing all night, drink beers and wine, teach Liquid War strategies to my 5 and 6 year old daughters, remember the old times when Liquid War wasn't so cool 8-)

# Appendix B Fanfic

Quoting Gavin: “I wrote a liquid war fanfic some time ago [...] I wrote it after a friend claimed that there wasn’t any liquid war fanfic because it wasn’t possible.”

So here it is, a Liquid War fanfic. It was initially written for Liquid War 5, but applies to Liquid War 6 as well. Enjoy!

## B.1 The Battle of Emberlificoted

...

The General presided over his massing army in his seat, or rather hovering ring, of power. It dipped slightly as he flew low over his troops marching through the viscous marsh-like terrain. They were like children: obedient, loyal, and they ate a lot.

Glancing at the status panel mounted in front of him he grimaced; the other five armies: Yellow, Green, Orange, Turquoise, and, of course, Red, were also readying armies of a similar size to his own. His violet clones would have to fight hard and eat well to win this day.

Today would not be a battle of luck, the General mused, it would be a battle of tactics, of alliances, and of betrayal. Every clone was identical - that was the general idea behind clones - and the terrain seemed strangely symmetrical; it would not give advantage to any of the six armies amassed today. Glancing at the hologram of the battlefield projected in front of him the General noted that he would have to move quickly, Orange and Yellow were too close for comfort, though fortunately Baron Red’s army of eponymous coloured clones was the furthest.

General Violet’s fingertips were sweaty even before they touched the four main control keys in front of him. They were labeled ’W’, ’A’, ’D’, and, of course, the full retreat button - very useful for misleading foes and ambushing them as they pursued - ’S’. The keys were arrange in a roughly equilateral triangular pattern; with ’S’ forming the base and being adjacent to both ’A’ and ’D’, ’W’ formed the tip of the triangle.

A long breath left his parched lips as at last he made his move.

...

“Dammit!” he screamed moments later. He had misjudged Captain Yellow and Commander Orange; he had expected one at least to attack immediately, one he could have handled. They were working together - foiling his attempt to shoot between them to near the center of the battlefield to gain a better vantage point. Yellow had shot down towards him, cutting off his advance, and now Orange had sealed his escape route. “It’s not over yet” muttered the General. He opened a voice channel with Commander Orange:

“Very clever. Flawed, but still clever.”

“Flawed?” came the reply.

“Yes flawed, when the good Captain is finished devouring my army who do you think he will turn to next?”, bluffed the General - his hands worked quickly as he manoeuvred

his hovering control ring, all that his troops ever saw of him, carefully towards the weakest section of his attackers. If he could just break out a few units he could soon turn the tide against both Yellow and Orange.

"We have an alliance..." Orange's voice was unsure now.

Time for some sarcasm to through her even more off balance, thought the General,

"I gathered", he spoke softly, slowly, and with too much meaning. Then closing the channel he turned his attention back to his escape.

...

"Yes!" wooped the ecstatic figure of the General. Fifty or so of his troops had broken free undetected and were even now working their way cautiously towards the camps of the Yellow army, only the front lines were still actively fighting; this opening gambit of Yellow and Orange had turned into a stale siege and Yellow's army had pitched tent.

General Violet steered his hovering guidance ring to the center of the Yellow camp. His troops struck, both those who had got behind the lines and those who were still besieged. Yellow reacted too slowly and suddenly found that her army, was shrinking back from the onslaught. There was nowhere to run to, and bye now her only ally - Commander Orange - had abandoned her to her fate; he was too busy engaging Sir. Turquoise, who had managed to escape from the slaughter that the Baron had caused to the Turquoise ranks and was even now valiantly attacking the flanks of the Orange troops.

A glance at the status panel showed that Yellow's life force was fading quickly: 8%, 3%, 1%, Gone.

The General smiled, he always enjoyed getting the first kill, and by now his armies life force had grown and his clones had replicated. With his, now, formidable fighting force it was no problem to engulf both Sir. Turquoise and Commander Orange's brawling armies and annihilate them. Once again his army grew in size and power. Now if only the Baron didn't notice that..., thought the General.

...

"Too late!" yelped the General, now thrown into panic, as he saw the approaching Baron. His army had also grown in size and power - having fatally injured the Turquoise army within the opening moments of the battle, and having finally managed to catch the elusive fleeing form of, or what remained of, Emperor Green.

Gripping the controls harder the General thought quickly, his army doesn't so completely outnumber me that this is already over, however unless I can cause him to make a mistake that allows me to take the upper hand then I will inevitably lose. Maybe I can...

This thought was terminated and replaced by another as the Baron's angry red troops broke through the undergrowth that had covered their movements and started to surround the General's army. The thought that now throbbed through the panic-stricken mind of General Violet was simply 'Run!'.

Even as he signaled the retreat and made for what seemed to be the only possible means of escape the Baron's blood red control ring appeared at the opening. The General knew it was over, even before the host of red beings appeared at the opening.

There was no escape. His life force was almost depleted and he was surrounded. Then it was that the Baron decided to communicate:

"Too bad. It was a good game"

The General blinked, gaped, and was generally gobsmacked. Just before his life force completely failed and his own weary eyes closed in defeat he snarled,

"What!? This is not a game!" were the General's dying words.

# Appendix C Links

This section lists various Internet Liquid War related links.

## C.1 Official links

These are the "official" links, hopefully you'll find everything you need here:

- http://www.gnu.org/software/liquidwar6/: Liquid War 6 homepage
- http://www.gnu.org/software/liquidwar6/manual/: Online manual
- http://download.savannah.gnu.org/releases/liquidwar6/: Savannah downloads
- http://www.ufoot.org/download/liquidwar/v6/: ufoot.org downloads (mirror)
- http://www.ufoot.org/liquidwar/v6/snapshots/: daily snapshots
- http://git.savannah.gnu.org/cgit/liquidwar6.git: GIT repository
- http://savannah.gnu.org/projects/liquidwar6/: Project on Savannah
- http://savannah.gnu.org/bugs/?func=additem&group=liquidwar6: Submit a bug report
- http://lists.gnu.org/archive/html/help-liquidwar6/: Mailing-list archives
- http://ufoot.org:8056/: Permanent "seed" server running latest snapshot

## C.2 Other sites

Note that some of these links might link to and/or promote proprietary software. It's important to emphasize Liquid War 6 is free software, free as in speech, and you are encouraged to use software that protects your freedom. However, for your convenience, those links are provided, they might give you a hopefully neutral idea of what the game is all about.

This list is also by no way extensive, it's provided "as is".

- http://en.wikipedia.org/wiki/Liquid_War: Liquid War entry on Wikipedia
- http://fr.wikipedia.org/wiki/Liquid_War: Liquid War entry on Wikipedia (French)
- http://freecode.com/projects/liquid-war-6: Liquid War 6 on Freecode.
- http://www.ohloh.net/p/liquidwar6: Liquid War 6 on ohloh.

## C.3 Old stuff

Various links that are deprecated, but still might contain interesting informations for those who enjoy digging into the past.

- http://arch.sv.gnu.org/archives/liquidwar6/: GNU Arch repository (replaced by Git as for this project)
- http://www.ufoot.org/liquidwar/v5: Liquid War 5, the previous version of the game.
- http://git.savannah.gnu.org/gitweb/?p=liquidwar6.git: Gitweb interface, cgit seems to be Savannah's default now.

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Version 3, 29 June 2007

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