

Galois Manual 0.2

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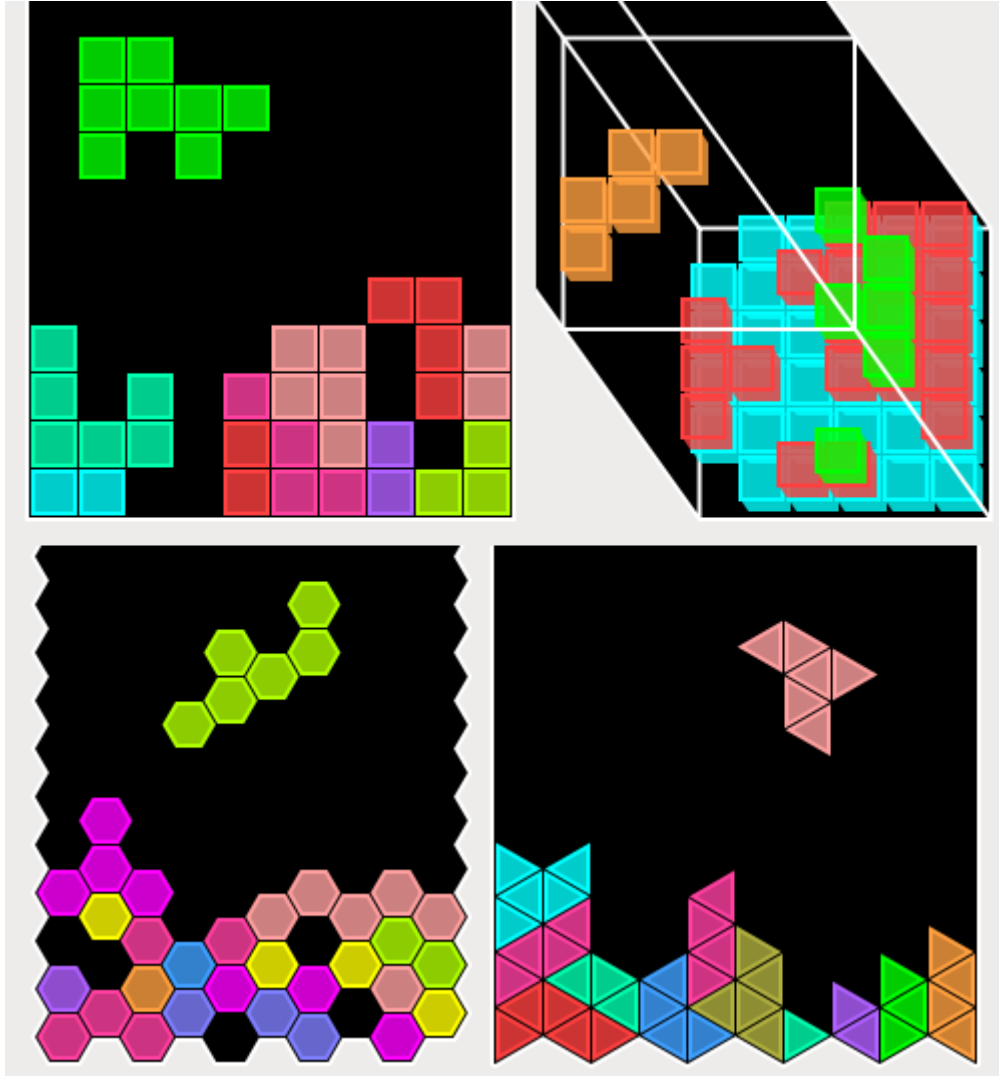
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1 Introduction

Galois is a computer game of the "falling blocks" type, but with unique features. Unlike most other games of that type, it is not limited to blocks made of four two-dimensional, square bricks: you can choose among several different brick shapes, blocks composed of more or less bricks, and even between two- and three-dimensional games.



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1.1 Name of the Game

Évariste Galois was a French mathematician, one of the founders of "group theory", a framework that encompasses nearly all fields of modern mathematics. This game makes use internally of groups of a specific kind, namely, symmetry groups. Because the first falling blocks game (which unfortunately was a proprietary program) had a name which ended in "is", I thought calling mine Galois would be a nice homage to both. And as an added bonus, it starts with G, like Gtk+ and GNOME.

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2 How to Install

2.1 Supported Platforms

Galois is supposed to run on every system where the necessary dependencies (listed below) are available. This includes (but is not limited to) GNU/Linux, BSD, Microsoft Windows, and Mac OS X.

It has actually been tested on the following systems:

- Debian GNU/Linux stable, version 6.0 "Squeeze", i386 architecture (i.e., 32-bit PC). That is my own computer, thus it is and will remain the best supported platform in the foreseeable future.
- Microsoft Windows XP and 7, 32-bit.

If you try it on another system, whether you succeed or fail, please let me know.

2.2 Hardware Requirements

Being a game that doesn't require fast animation nor sophisticated graphics, Galois has very low requirements. It should run well even on very old and cheap computers and without hardware acceleration. Only when new block sets are generated, which happens at level changes when the "increase block size" option is selected, you might see Galois "freeze" for a short time on slow machines.

2.3 Dependencies

In order to compile Galois, the following packages must be installed on your system:

- A basic Unix environment, including the `make` utility
- `g++` or another standard-compliant C++ compiler
- `gtkmm 2` with cairo support, i.e., version 2.10 or later
- `libxml++`

For all major versions of GNU/Linux, precompiled versions of these packages are available. Precompiled libraries are usually split into a "base" and a "development" package (the latter has a name ending with `-dev` or `-devel`). In order to compile Galois, you must install both; while in order to run the compiled program, only the base packages are required.

Package names for Debian 6.0 (Squeeze):

- base packages: `libgtkmm-2.4-1c2a`, `libxml++2.6-2`.
- compiler and development packages: `make`, `g++`, `libgtkmm-2.4-dev`, `libxml++2.6-dev`.

Packages for other GNU/Linux distributions should have similar names, particularly for Debian-based distributions like Ubuntu.

If you are installing a precompiled binary package (see below), you normally need not worry about having the necessary dependencies installed because the package management system takes care automatically.

2.4 Binary Packages

At this moment, precompiled Galois binaries are available for the following platforms:

- Debian GNU/Linux, i386 architecture.

If you run another Debian architecture, you may download the source package and rebuild it. If you send to me the compiled package (and swear that it does work correctly!), I may upload it to the Galois web site.

The Debian package may work also on Debian-based distributions like Ubuntu. If you try, please let me know.

- Microsoft Windows: there is a Galois binary that you can download and run, but there isn't a full installation package which will also install documentation files and make Galois appear on the programs menu.

The binary was built on Debian GNU/Linux using the [MXE](#) cross-compiling environment.

For other platforms, Galois must be compiled from source (see below). I am willing to provide binary packages if someone volunteers to build and maintain them.

2.5 Source Installation

To install Galois from source, first unpack the compressed archive file `galois-0.2.tar.gz` in a directory of your choice. Then open a command-line shell (console or terminal), change to the base directory of the unpacked source tree, `galois-0.2`, and type the following commands:

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

`configure` has many command-line options by which you can specify where to install, where to find dependencies (you'll need this if they are installed in nonstandard places), which compiler flags to use, and so on. Run `./configure --help` for a complete list.

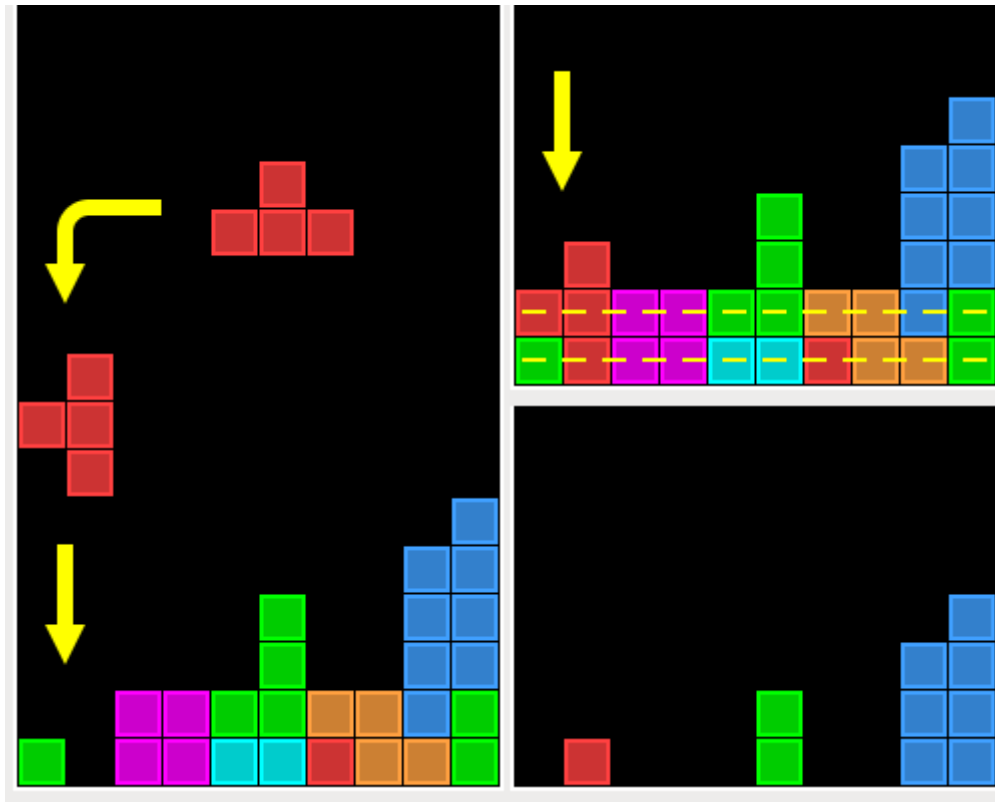
For the **make install** step, you need write permission on the installation directory. At least on GNU/Linux, if you are installing in the standard place (i.e., under `/usr/local`), this means you must run that command as root (use **su** or **sudo**).

3 How to Play

Galois games are played on a board made of square, hexagonal, triangular or cubic cells, where blocks made of "bricks" packed together, each brick filling a cell, fall at a regular pace, one at a time, until they land on the bottom of the board or over other blocks.

While they are falling, you can move them horizontally, rotate and optionally reflect them, so that when they land, they fit together with other blocks, leaving as few empty cells as you can. When a horizontal line (or, in 3D games, plane) is filled completely with bricks, they are removed from the board, and all bricks that were above them move down by one cell. (You can also remove multiple lines at once if you fill them with the same block.)

The goal is to remove lines (or planes) fast enough to prevent bricks from piling up to the top of the board: when there is no more space to accommodate a new falling block, the game is over. This becomes more and more difficult as the game proceeds, because, depending on the selected game mode, either the speed at which the blocks fall down, or the number of bricks composing the blocks, increase as more lines are filled.



3.1 Running Galois

If you are running a graphical environment that supports the XDG menu specification (e.g., GNOME or KDE), you'll see an entry for Galois in the system menus (under Applications → Games in Gnome 2), and can start it by clicking on that entry. Otherwise, you may create a shortcut to the `galois` executable file on your desktop, or open a file manager and browse to the directory where it was installed (typically `/usr/games` or `/usr/local/games` on GNU/Linux systems), or run it from the command line. To do the latter, type **galois**, then press **Return**.

To start a new game, choose Game → New from the menubar, or press Ctrl-N. This command is disabled while a game is already active (running or paused).

To pause a running game, or resume a paused game, press the key assigned to the Pause action: by default it's **Escape**.

To stop permanently a running or paused game, choose Game → Stop from the menubar. If no game is currently active, this command is disabled.

To open the preferences dialog, choose Game → Preferences from the menubar. This command is disabled while a game is active.

To open the scores dialog, choose Game → Scores from the menubar. This command is disabled while a game is active. The scores dialog will also pop up at the end of the game whenever you set a score that ranges within the top 10 for the current settings, and will let you enter your name in that entry.

To get help on Galois, choose Help → Contents from the menubar, or press **F1**. The Galois Manual (i.e., this document) will be displayed. If you aren't running GNOME, this might not work; in any case HTML and PDF versions of the manual are shipped with the source tarball, and can also be downloaded from the Galois web site.

To get basic information on Galois, choose Help → About from the menubar.

To quit Galois, choose Game → Quit from the menubar, or press Ctrl-Q.

3.2 Game Interface

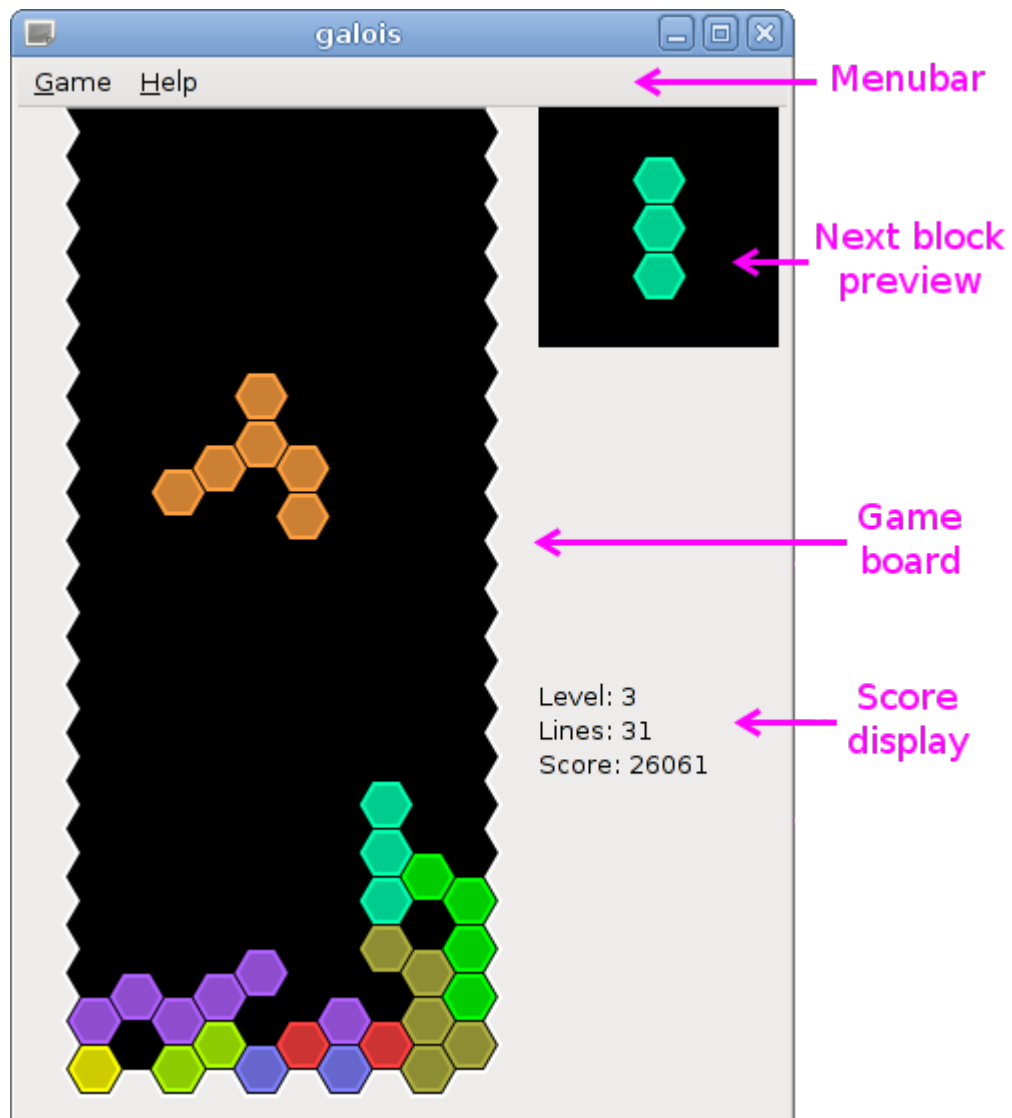
The Galois window contains the following elements:

Menubar At the top of the window. It contains menu entries to start a new game; stop the current game; open the preferences and scores dialogs; get help and information about Galois; and quit the program.

Next block preview At the upper-right corner of the window.

Game board At the left of the window. This is the main element of the game interface: that's where blocks fall.

Score display At the right of the window. Shows the current score, level, and number of filled lines.



3.3 Game Controls

While blocks fall, you can perform the following actions on them:

- Move left or right, and in 3D games up or down.
- Rotate: in 2D games there is a single rotation mode (counterclockwise), in 3D games there are three (along axis X, Y, and Z).
- Reflect: this action can be turned on or off in the preferences dialog. By default it's off.
- Drop: the block will fall down instantly.

You can perform each of those actions by pressing the corresponding key on the keyboard. The mapping between actions and keys is shown in the preferences dialog and can be changed by the user. The default mapping is as follows:

- For 2D games: **Left** and **Right** to move the block, **Up** to rotate, **Down** to reflect (if allowed) and **space** to drop the block.
- For 3D games: **Left**, **Right**, **Up** and **Down** to move in the four directions, **1**, **2** and **3** to rotate, **4** to reflect (if allowed) and **space** to drop the block.

I set up separate sets of controls for 2D and 3D games because in 2D, **Up** for rotate is the norm in falling blocks games and lets you play comfortably with a single hand; but in 3D it is natural to use the four arrow keys to move in the four directions.

3.4 Preferences

The preferences dialog has two tabs:

Game Settings about the game geometry and playing modes:

- Choose the game geometry among: square, hexagonal, triangular (all these 2D), and cubic (3D), with or without block reflection.
- Choose the board width and (for 3D games) depth.
- Choose what to do on level changes (every 10 filled lines): either increase game speed, or the maximum block size. In the latter case, you can also choose whether to increase, keep fixed or decrease the minimum block size.
- Choose the initial speed level and maximum and minimum block size.
- Choose whether to preview the next block.
- Choose whether to display where the block will land.
- Choose whether to remove lines also when they aren't completely filled: up to 2 missing bricks can be allowed. Of course that will make the game significantly easier.

Controls Settings about the keyboard controls: to change any of them, double-click on the current key label (or select it with the keyboard and hit Enter) and when it gets highlighted, press the key that you want to replace it with.

Settings are saved into the file `config_dir/galois.conf`, where `config_dir` is the path returned by the glibmm function `get_user_config_dir()` on your computer (typically `$HOME/.config` on GNU/Linux systems). You may restore the pristine settings by deleting that file.

3.5 Scores

Galois records the scores of all games together with their respective settings. The scores dialog shows the top 10 scores for the current settings.

Scores can be filtered by various criteria, for example you can choose whether to see only games played with a specified initial range of block sizes, or all games played with square bricks, or even with any brick shape. The filters can be changed using the buttons and boxes at the top of the scores dialog.

Scores are saved into the file `data_dir/galois.res`, where `data_dir` is the path returned by the glibmm function `get_user_data_dir()` on your computer (typically `$HOME/.local/share` on GNU/Linux systems).

4 How to Contribute

"Freely you have received, freely give." (Matthew 10:8)

If you would like to help making Galois better, you're welcome to contact me (see the section entitled "[Contact Information](#)"). You must agree to license your contributions as free software under the license Galois is released with (the GNU General Public License, version 3 or later).

5 Contact Information

The Galois web site is at <http://www.nongnu.org/galois/>

For any requests about Galois, send email to galois-list@nongnu.org

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Version 3, 29 June 2007

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