

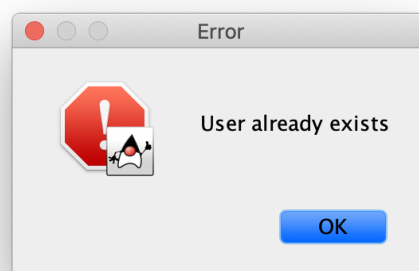
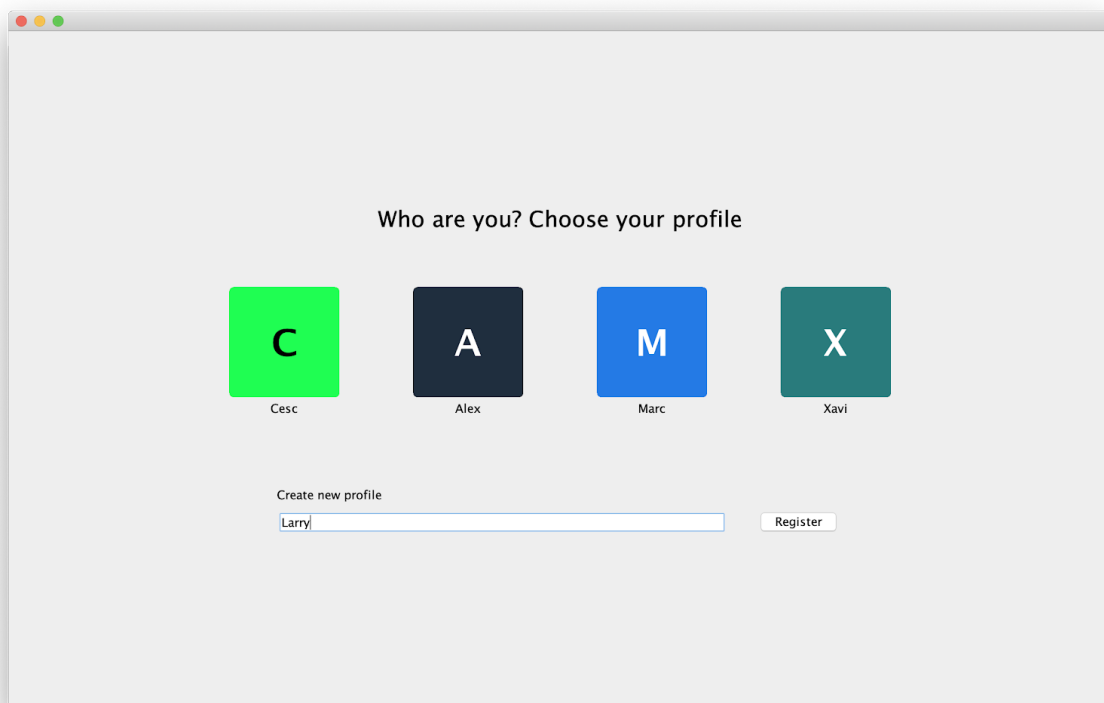
USER GUIDE

Recommendation: We strongly advise the reader of this document to have the file ui.pdf in hand as the scenarios described in each section correspond to the actions a user can do on a certain screen, and it will be much more understandable if the reader can follow the visual representation of the screens.

Login:

When running the program for the first time, the user will be presented with the Login screen. This screen will display all the users registered in the application, if there are any. When the icon for a profile is clicked, the user will be redirected to the dashboard screen for that profile, and will remain logged in as that profile until the “log out” button is pressed.

If we wish to register a new profile, we can type its name in the text field below the user’s icons and then press the “register” button. If a profile with that name was not previously registered, the user will be redirected to the dashboard screen. Otherwise, a dialog will pop up informing the user that the name is not valid.



Dashboard:

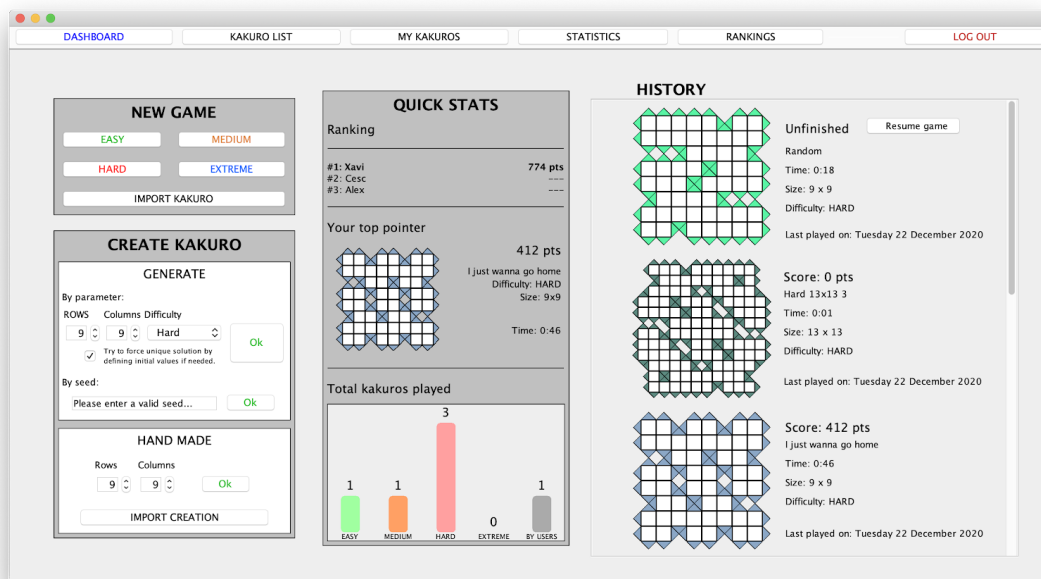
The dashboard is the main screen of the application which provides some stats about the players and a quick menu to start a new game.

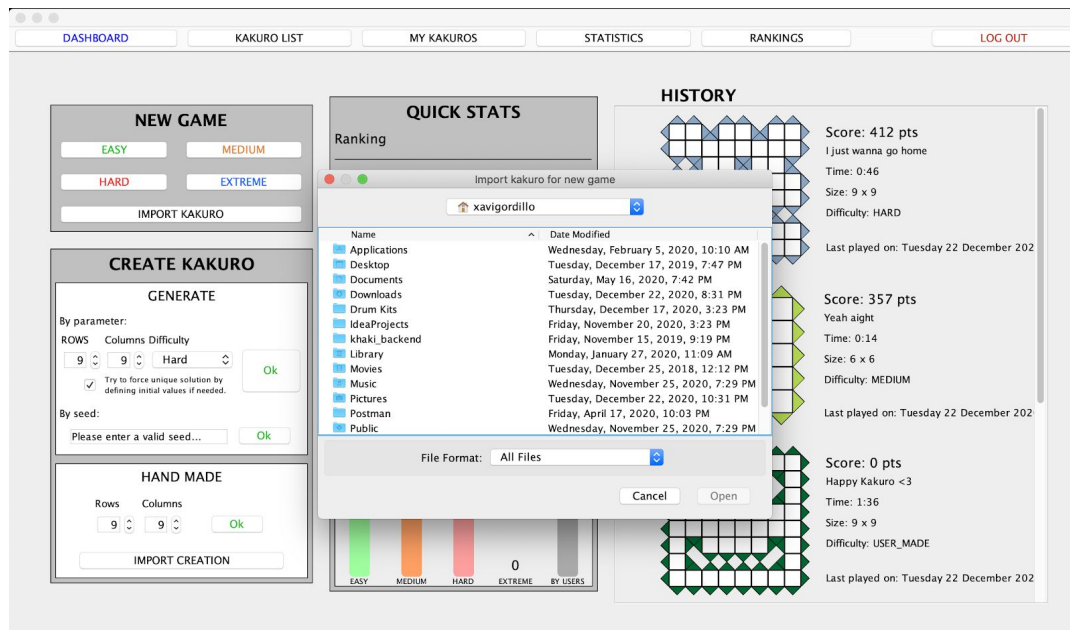
The dashboard can be accessed by logging to a profile or at any moment by clicking on the “dashboard” button in the upper left corner. On the leftmost column we have three options for starting a new game. The first, displayed under the “new game” label, will let the user click on any of the four buttons representing a difficulty. When clicking one of the buttons, the kakuro list screen for that particular difficulty will load.

The user can also choose the option to import a kakuro by clicking the “import kakuro” button, which will open a file explorer window. If the file containing the kakuro is readable by the program, a dialog window will be displayed asking the user to name the kakuro. Once the kakuro is given a unique name, the user will be redirected to the game screen. Otherwise, an error message will pop up.

Underneath we have the “Create Kakuro” section, which allows the user to generate a new Kakuto in three different ways. First, by telling the program to generate one given the row and column size and the difficulty. We also have the option to force the program to generate a kakuro with a unique solution, which may have some values assigned to white cells. Ae also have the option to generate a kakuro by providing a seed in the appropriate format. The same two seeds will always yield the same exact kakuro (even the color will be identical). When we press the “ok” button, we are prompted to name the kakuro with a unique name, and then we are taken to a screen that shows us the generated kakuro the kakuro has been generated. When we press the ok button, we are taken to the “my kakuros” screen.

The third option for generating a kakuro is by doing it by hand. This option is displayed under the “hand made” panel. We can either start a new empty kakuro by specifying the rows and the columns or import a kakuro to edit it. When we do either, we will be taken Creator screen.





Kakuro List:

We can access the “Kakuro List” screen by clicking on the “Kakuro List” button on the upper part of the window. This screen will list the kakuros that have been saved in the program. We can choose between the difficulties of the kakuros with the tabs in the upper part of the screen. Each item in the list will display a minimalistic view of the kakuro, as well as some data about it (name, difficulty, etc). We also may have a colored label, which indicates the state of the kakuro. It will be red with a “X” if the user surrendered while playing the kakuro for the first time, yellow with a “U” if the kakuro is in progress and green with a “S” if the kakuro was solved successfully.

The button with “=” on it will open a file browser to export the kakuro, while the “Copy seed” button will copy the seed of the kakuro to the clipboard. Next to that button, we have a “Play” button, which will start a new game when clicked, redirecting the user to the Game Player screen. When the button displays “Resume” instead of “Play”, clicking it will take the user to the Game Player screen, with the Kakuro in the same state that we left it in before we left the game being played.

[DASHBOARD](#)

[KAKURO LIST](#)

[MY KAKUROS](#)

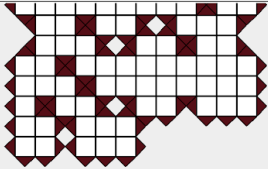
[STATISTICS](#)

[RANKINGS](#)

[LOG OUT](#)

Kakuro List

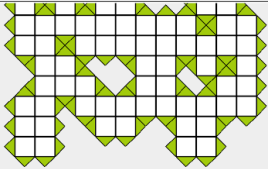
[EASY](#)[MEDIUM](#)[HARD](#)[EXTREME](#)[BY USERS](#)



Easy 13x13 2
Difficulty: EASY
Size: 13x13

Times played: 0
Owner: System
Creation date: 2020-12-22

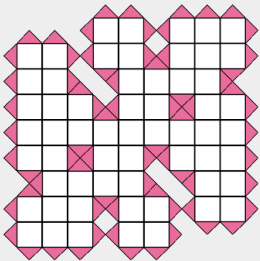
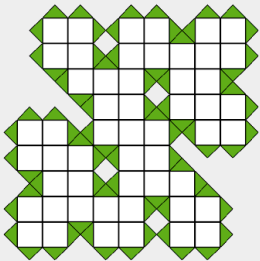
BEST TIME: ---



Easy 13x13 1
Difficulty: EASY
Size: 13x13

Times played: 0
Owner: System
Creation date: 2020-12-22

BEST TIME: ---



[DASHBOARD](#)

[KAKURO LIST](#)

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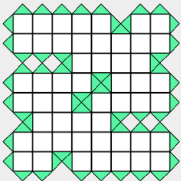
[STATISTICS](#)

[RANKINGS](#)

[LOG OUT](#)

Kakuro List

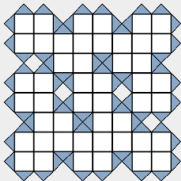
[EASY](#)[MEDIUM](#)[HARD](#)[EXTREME](#)[BY USERS](#)



Random
Difficulty: HARD
Size: 9x9

Times played: 1
Owner: Xavi
Creation date: 2020-12-22

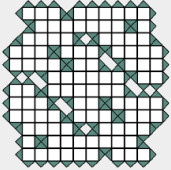
BEST TIME: ---



I just wanna go home
Difficulty: HARD
Size: 9x9

Times played: 1
Owner: Xavi
Creation date: 2020-12-22

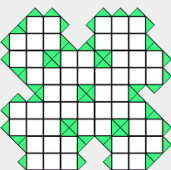
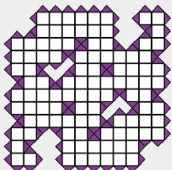
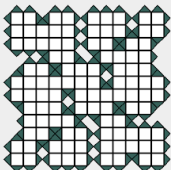
BEST TIME: 0:46



Hard 13x13 3
Difficulty: HARD
Size: 13x13

Times played: 1
Owner: System
Creation date: 2020-12-22

BEST TIME: ---



Hard 13x13 2
Difficulty: HARD
Size: 13x13

Times played: 0
Owner: System
Creation date: 2020-12-22

Hard 13x13 1
Difficulty: HARD
Size: 13x13

Times played: 0
Owner: System
Creation date: 2020-12-22

Hard 10x10 3
Difficulty: HARD
Size: 10x10

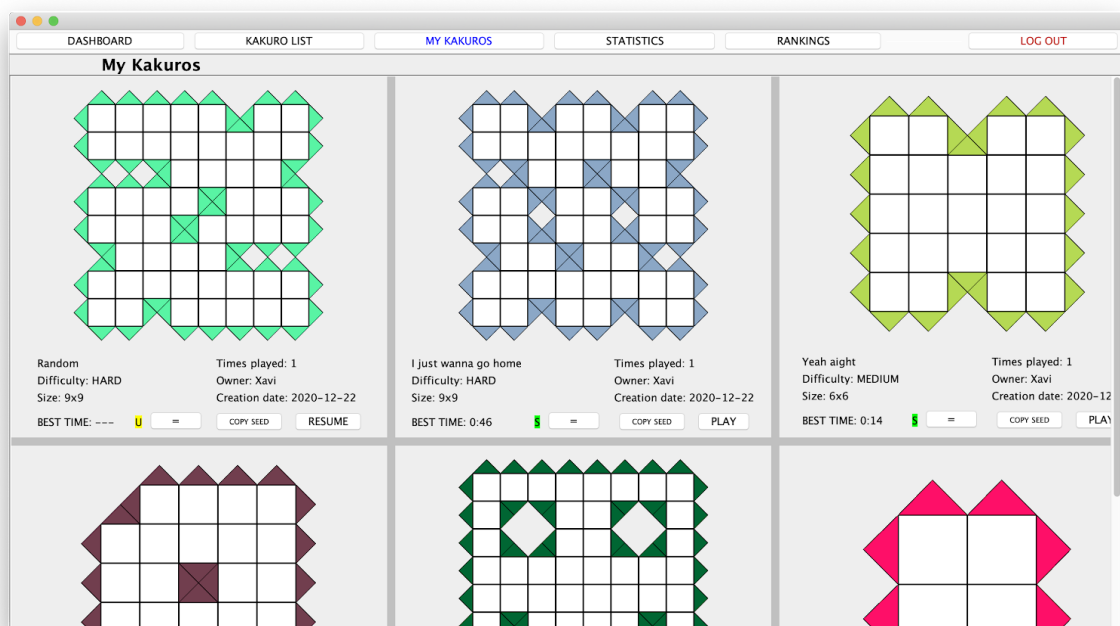
Times played: 0
Owner: System
Creation date: 2020-12-22

My Kakuros:

This screen is almost identical to the “Kakuro List” screen, the only difference being that only Kakuros owned by the current User are listed.

Each item in the list will display a minimalistic view of the kakuro, as well as some data about it (name, difficulty, etc). We also may have a colored label, which indicates the state of the kakuro. It will be red with a “X” if the user surrendered while playing the kakuro for the first time, yellow with a “U” if the kakuro is in progress and green with a “S” if the kakuro was solved successfully.

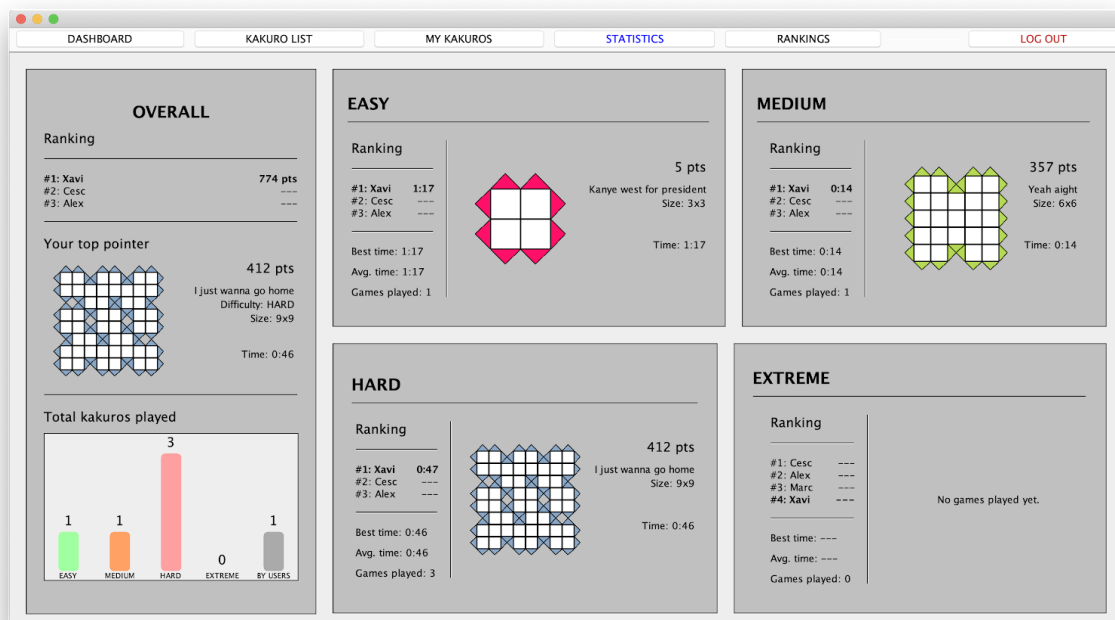
The button with “=” on it will open a file browser to export the kakuro, while the “Copy seed” button will copy the seed of the kakuro to the clipboard. Next to that button, we have a “Play” button, which will start a new game when clicked, redirecting the user to the Game Player screen. When the button displays “Resume” instead of “Play”, clicking it will take the user to the Game Player screen, with the Kakuro in the same state that we left it in before we left the game being played.



Statistics:

On the left-most panel there are the overall statistics (we had them as well in the dashboard screen), where you can see the top three (plus the user's position if it isn't in the top three) in the overall ranking by points followed by the overall top pointer kakuro (the one that has gained you the most points) and its information and lastly the chart with the amount of games played.

On the center - right part of the window there are four cards, one for each difficulty, that each show the ranking by average time of resolution, and the information of the user in that specific difficulty: best time, average time, number of games played and the kakuro that has awarded him the most points as well as some information of the game.



Rankings:

There are three main sections on this screen, two on the left and one on the right.

All lists are scrollable if enough users were registered.

- Point system ranking:
In this section there appears a list of the users ordered by total points, but you can also see the points achieved in the different difficulties (a user made kakuro doesn't have a difficulty so we don't grant points for it).
- Games played:
In this section there is a list of the users ordered by number of games played as a way to see the "experience" that a user has playing kakuros. There are also the games played in each difficulty.
- Avg. times by difficulty:
For each of the four difficulties there is a complete list of the users ordered by the average time they spend solving kakuros of such difficulty.

Dashboard

Kakuro List

My Kakuros

Statistics

Rankings

Log Out

Point-System Ranking

Name	Easy	Medium	Hard	Extreme	Total points
Xavi	5 pts	357 pts	412 pts	0 pts	774 pts
Cesc	0 pts	0 pts	0 pts	0 pts	0 pts
Alex	0 pts	0 pts	0 pts	0 pts	0 pts
Marc	0 pts	0 pts	0 pts	0 pts	0 pts

GAMES PLAYED

Name	Easy	Medium	Hard	Extreme	Total games
Xavi	1	1	2	---	4
Cesc	---	---	---	---	---
Alex	---	---	---	---	---
Marc	---	---	---	---	---

AVG. TIMES BY DIFFICULTY

EASY

Name	Avg time
Xavi	1:17
Cesc	---
Alex	---
Marc	---

MEDIUM

Name	Avg time
Xavi	0:14
Cesc	---
Alex	---
Marc	---

HARD

Name	Avg time
Xavi	0:46
Cesc	---
Alex	---
Marc	---

EXTREME

Name	Avg time
Cesc	---
Alex	---
Marc	---
Xavi	---

Game player:

User input:

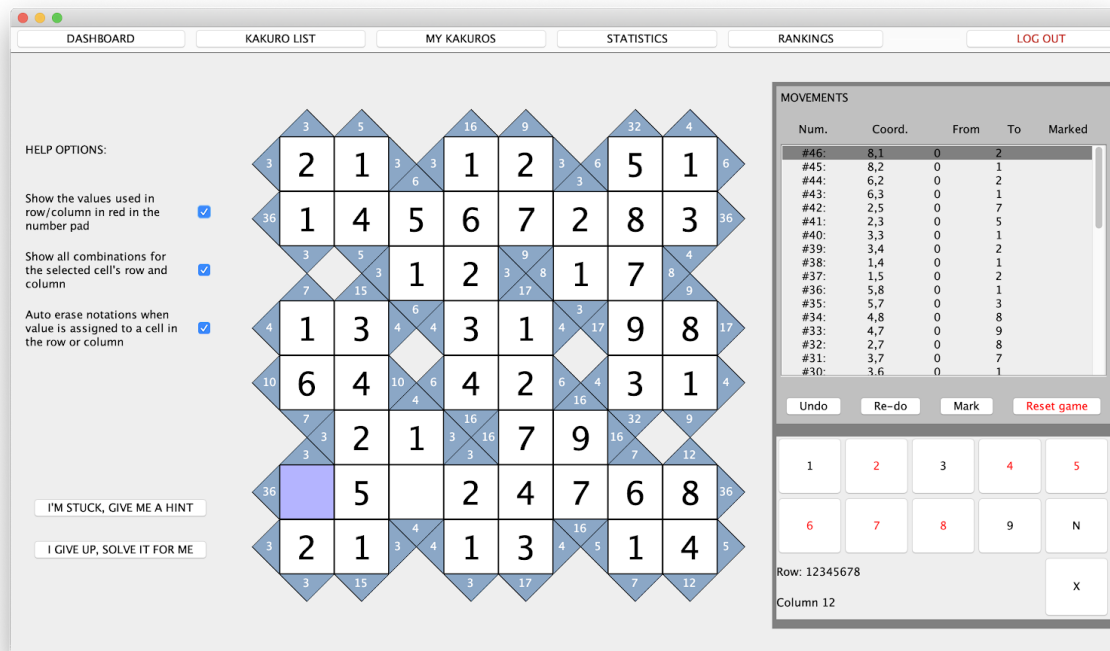
- To select a cell in the board click on it and it will turn blueish to indicate that it is selected.
 - To assign a value to a selected cell press one of the number buttons on the right panel.
 - If the move is “illegal”, which means that either the value is already in that row or column or the number would make the total sum of the row or column be greater than the expected sum. The conflictive cases will be highlighted in soft red: the black cells at the beginning and end of the conflictive row/column or the white cell with the repeated value.
 - If the move is accepted you will notice that something appears in the panel titled *Movements*.
 - The Movements panel:

This panel keeps track of all your movements (assigning or clearing white cells) and lets you revisit the board in the state that it was at a certain point. Let's say you're on move 14, try clicking on the 9th move of the list and the board will be set to the state it had 5 moves previously. There are also four buttons under the main panel:

 - Undo: Sets the board to how it was exactly one move before (unless there are no moves or the initial state is reached).
 - Re-do: It plays the next move on the board. It only works when the user has selected a previous move earlier and the board is not at the most advanced state.
 - Mark: This tool will place a kind of a yellow bookmark at the right of the selected move in the list panel. This way if you have to make an important decision you can remember where to go back if it goes badly, so it is a really handy tool. Warning: These marks on the moves are not saved, they are a temporary in-game tool but if you exit the game and continue later they will not appear again.
 - Reset game: This button has red letters and there's a reason for it. If you press it you will get prompted with a confirmation dialog because this button resets the movement list, meaning that it undos all the movements at once and leaves the board in initial state.
- Lastly if you select a move that is not the most recent one and then play another move, all the moves on the list on top of the one you just played will get erased.
- To change the value of an already assigned cell you can either click the button on the right marked with an X, which will clear the selected white cell's value, or click on another valid number button whose value will replace the white cell's.
 - The Annotations tool:

The button on the lower right with an N enables a very useful tool which is most known to appear in Sudoku playing apps as “Pencil tool”. When clicked you'll notice that it stays pressed down. While this mode is enabled the values that you place on the cells will be smaller, gray and you can place multiple annotations at once (be

careful, even obviously incorrect annotations can be placed in a cell, we don't check it as this is a tool aimed at letting the user make the annotations that he desires).



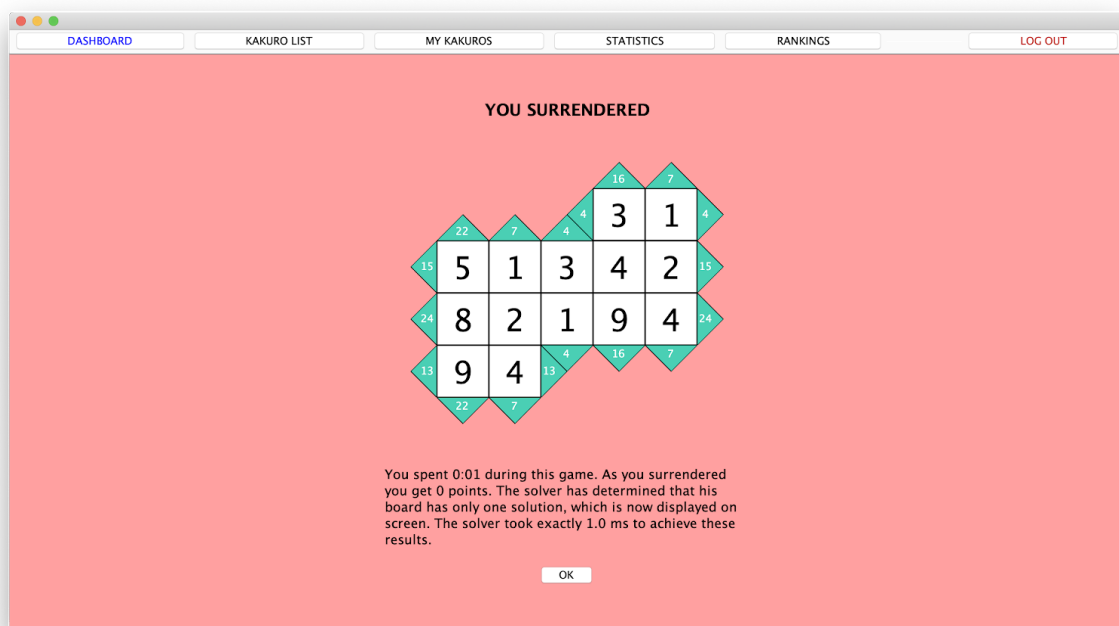
Help mechanisms:

- On the top left there are three checkboxes that enable three “real time” help options:
 - Toggle the first one and the values that are already used in the selected cell's row and column will appear in color red in the number buttons, this is helpful to more quickly see what values can't be assigned and find a value (not in red) that precisely fits the intersection of row and column.
 - Toggle the second one and all possible combinations (123 and 231 are considered the same) for the row and column will appear in the white rectangle at the bottom right of the window (you were wondering what that was for right?) . You'll see that if you select a cell before and after playing some moves these options get reduced, this is because we only show you possibilities that fit in the remaining white spaces, for the certain sums and taking into account the values that have already been placed. This is second to the most helpful options we offer.
 - The third option is for those who like using the annotations to keep track of the possibilities left in each cell but forget (or are too lazy) to remove them once the value is placed in a neighbouring cell. This help option will automatically remove a value from a cell's annotations if that value is placed on a different cell in the same row or column.
- This is my personal favourite (and it will be yours too!), if you click on the *I'm stuck, give me a hint* button we have designed a system that will first check if the board in the current state has a solution and if it hasn't it will select a move in the movements panel that was wrongly made and previous to which the board still had a solution (you shall click undo or clear and play another move). If it still has a solution, the

system will try to find a cell that can more or less be “human-intuitively” easy to solve, it does this by checking first the obvious options, just in case you missed a length-one line, and if it doesn’t find it it does inference on each cell’s possibilities by imitating your game process until a cell value that you haven’t assigned yet can be discovered. Warning: In some cases (mostly in large complicated kakuros), this system might not find a hint for a given board state, it will warn you if this happens and you can try to call it again after playing a couple moves to “unblock” the complicated position and it might find hints again.

If you have already asked for a hint and a cell was highlighted an orange and you ask for another one the system will place the value in that cell (if you haven’t played any moves).

- If you get tired of playing a game or it seems unsolvable you can surrender by clicking on *I give up, solve it for me* which will call our solver algorithm and a screen will appear displaying the solution as well as how much time did the algorithm take to find the solution/s.



If at any point you switch screens or close the app your progress will be saved and you can resume your game from the dashboard history or the kakuro lists.

DASHBOARD

KAKURO LIST

MY KAKUROS

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HELP OPTIONS:

Show the values used in row/column in red in the number pad

Show all combinations for the selected cell's row and column

Auto erase notations when value is assigned to a cell in the row or column

I'M STUCK, GIVE ME A HINT

I GIVE UP, SOLVE IT FOR ME

40

4

1

34

27

2

3

39

40

1

2

4

3

5

6

36

1

1

2

3

9

2

1

3

2

2

3

7

9

11

4

3

38

3

2

3

11

4

3

3

37

3

3

11

4

3

3

3

4

4

1

2

4

3

5

6

36

1

2

4

3

5

6

36

MOVEMENTS

Num.	Coord.	From	To	Marked
#19:	4,3	0	2	
#18:	2,5	0	2	
#17:	3,4	4	9	
#16:	3,4	0	4	
#15:	2,1	0	1	
#14:	1,6	0	2	
#13:	1,7	0	3	
#12:	2,8	0	2	
#11:	3,8	0	1	
#10:	8,2	0	1	
#9:	8,3	0	2	
#8:	8,4	0	4	
#7:	8,5	0	3	
#6:	8,6	0	5	
#5:	8,7	0	6	
#4:	7,1	0	4	
#3:	7,8	0	4	

Undo

Re-do

Mark

Reset game

1

2

3

4

5

6

7

8

9

N

Row: 12345689

Column 123489, 123579, 123678, 124569, 124578, 234567

X

DASHBOARD

KAKURO LIST

MY KAKUROS

STATISTICS

RANKINGS

LOG OUT

KAKURO SOLVED!

4

11

3

1

2

3

12

3

9

12

4

11

You spent 1:17 during this game and obtained a total of 5 points!

OK

Creator:

First view at the layout:

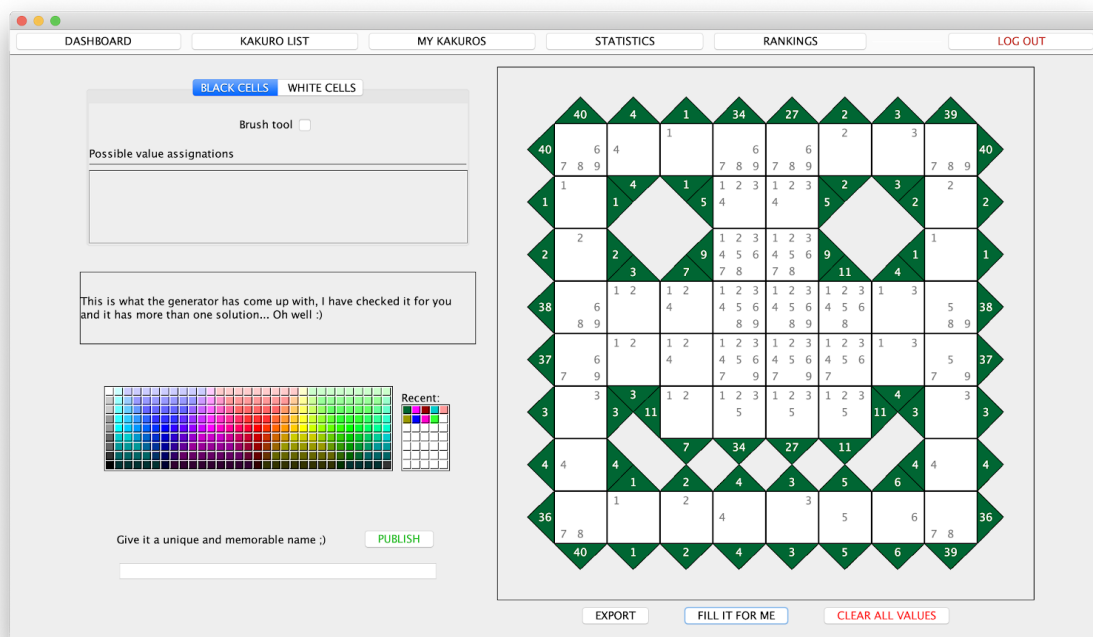
On the top left corner of the screen there is a section with two tabs, one is dedicated to the input related to the black cells and the other one to the input related to the white cells.

Right below this first section there is what we have named “TipBox” which displays messages that give the user information about what is happening with the value assignments it does to the cells, advice on what to do next, warnings when there is some problem, etc.

Under that there is a color chooser section (as you might have noticed our kakuros are full of color) with which a user that is creating a new kakuro can define the color of the black (not so black now) cells of their new creation.

To complete the left part of the layout there is a text field to enter a unique name that will identify the kakuro and a button that either is in “VALIDATE” state, which means that the created kakuro has not been checked (we don’t allow to publish kakuros without solutions), or in the “PUBLISH” state, if it has been validated.

On the right side there is the board on which the user is working. All the white cells in the board display their still possible values which will be updated at each value assignment. If the board has a horizontal and/or vertical size of more than 10 all the white cells will initially appear in red, that is because when there is a line of length greater than 9, no assignments will be possible until the conflict is resolved (i.e. there are no rows nor columns of length greater than nine). In the user input we explain how to solve such issues.



User input:

There are two main ways to interact with the board on the right:

- The Brush tool:
In the tab section discussed earlier you can see that the contents on both tabs are identical, there is a checkbox next to “Brush tool” that enables the user to (quite literally) paint on the board which cells to turn black or white, depending on the tab. If a brush tool is enabled and the user switches tabs the brush tool gets disabled so the user won’t accidentally paint another cell (also only one brush tool can be enabled at a given time).
- Select and assign: (remember to disable brush tool)
Select a black cell “representative” for a row or column and in the top left input section there will appear the values that can possibly be assigned to its sum (after a shallow analysis, when one of them is assigned it can happen that a deeper analysis shows that it is not possible after all). This reduces a lot the amount of work that the user has to do and improves efficiency when developing new kakuros. Click on a specific possible value and a deep analysis will determine if it really can be assigned (usually it will), and in the board a couple things can happen. If it results that it isn’t possible the cell that would cause conflict will be highlighted in red, but if it is possible all the white cells whose possible values have decreased will appear in green as well as the black cells that get a sum assigned by inference.
A black cell that already has a value can be cleared by clicking in the button in red that will appear in the possibilities box marked by an X, this will only be possible if such value hasn’t been “deduced” by inference from other assignments, as this would cause said row or column to not have the only value that is possible to it (contradiction).
As our kakuro app accepts kakuros with initial values, white cells can also be selected in order to assign them an initial value, which will in turn update the possibilities in the same way as explained before.

All values of the board in progress of being created can be cleared at once with the red-lettered *Clear all values* button which will ask for confirmation and will erase all values and maintain the black cell - white cell structure of the board.

If you get tired of creating a kakuro you can ask our generator to give you a little help by clicking *Fill it for me* which will give you a possible valid assignment for all sums in the board, it might get a unique solution or it might get multiple solutions.

The creation process is not saved automatically like the playing process, but if you exit the creation screen without publishing your kakuro you will be asked if you want to export your progress to an external file of your choosing. You can also do this by clicking the *Export* button in the lower right set of buttons.

BLACK CELLS WHITE CELLS

Brush tool ☐

Possible value assignments

This is what the generator has come up with, I have checked and it has more than one solution... Oh well :)



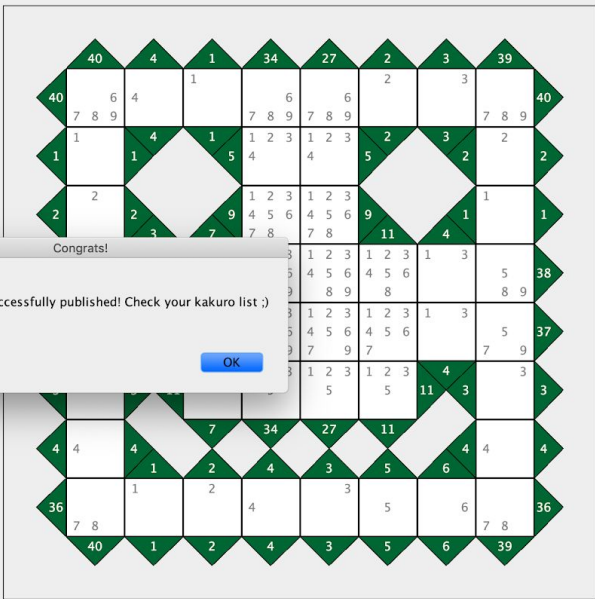
Give it a unique and memorable name ;)

Happy Kakuro <3

PUBLISH

Successfully published! Check your kakuro list ;

OK



EXPORT

FILL IT FOR ME

CLEAR ALL VALUES