

## The hardest sudokus (new thread)

POSTREPLY

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### Re: The hardest sudokus (new thread)

Day **Obi-Wahn** » Sat Apr 20, 2013 9:44 am

**champagne** wrote:  
Congratulations, as a first post, you entered what was considered one year ago as an extremely difficult field.

To be honest, I'm not that new to this forum. I posted as **Obi-Wahn** back in 2008 but since the forum was moved I can't seem to log into my old account. I even posted three of my own puzzles OW081006, OW081007 and OW081008 with SE 11.4 - 11.7 in the old ["The hardest sudokus"](#) thread, which unfortunately never made it to your database and are now attributed to someone else.

Regarding the multifish pattern, it also appears in the other three SE 11.8 puzzles next to the one I discussed above:

```
CODE: SELECT ALL
68.7.....3..89.....1..4...7...3.9...6...7...2...51.6..8.3.....5.4.....2;11.88;1.50;1.50;225578;c01;2012_11_10;0
68.7.....3..89.....5..4...7...3.9...6...7...2...51.6..8.3.....1..4.....2;11.88;1.50;1.50;225578;c01;2012_11_10;0
24.....1.....2.....14.5.....3.....6.5.7..4..8.....2..6..8..5.4.51.....9..7.3...;11.89;11.89;2.89;225585;00b;2012_11_10;0
```

For the last one the digit set would be 2,3,6,8.

BTW, the SK loop can also be described as a rank 0 logic with 16 cell constraints as base and 4 boxes, 2 rows and 2 columns for 2 digits each as cover. I don't know if it was ever described like that.

In David's example that would be:  
base: 2x2x6: 7x2x6: 1389x1, 1389x5 = 16 truths  
cover: 15b1, 37b2, 37b7, 15b8, 48r2, 68r7, 48c1, 26c5 = 16 links



**Obi-Wahn**  
Posts: 13  
Joined: 05 January 2007  
Location: Darmstadt, Germany

### Re: The hardest sudokus (new thread)

Day **champagne** » Sat Apr 20, 2013 3:10 pm

**svu** wrote:  
I even posted three of my own puzzles OW081006, OW081007 and OW081008 with SE 11.4 - 11.7 in the old ["The hardest sudokus"](#) thread, which unfortunately never made it to your database and are now attributed to someone else.

the general idea is to keep in the data base the oldest reference. I'll update the data base ASAP. (The ownership in not a key point).

**svu** wrote:  
Regarding the multifish pattern, it also appears in the other three SE 11.8 puzzles next to the one I discussed above:

I'll work to have an update of exotic properties immediately after the next update of the data base;

**svu** wrote:  
BTW, the SK loop can also be described as a rank 0 logic with 16 cell constraints as base and 4 boxes, 2 rows and 2 columns for 2 digits each as cover. I don't know if it was ever described like that.

It is described in the thread "exotic patterns a resume". BTW, it is my preferred rank 0 logic just because it follows exactly the logic I apply to find the SK loop.

### Re: The hardest sudokus (new thread)

Day **champagne** » Sat Apr 20, 2013 5:02 pm

Hi Obi\_Wahn,

I checked the status of your 3 puzzles.

They came again last year in my own search, so, it will be very easy to change the ownership.  
This will be done in the next update

**champagne**  
2017 Supporter

Posts: 7269  
Joined: 02 August 2007  
Location: France Brittany

### Re: The hardest sudokus (new thread)

Day **camb** » Wed Jun 19, 2013 5:21 pm

Hi Tarek,

I was curious about whether some of the most difficult puzzles were machine generated. For example, I'm using a constraint-based search and find 00041 (ranked in q1's top five) to be exceptionally difficult:

"Label: HardestSudokuThread-00041;tarx0001;Fata\_Morgana"

Do you know whether this puzzle was handcrafted or machine generated?

Thanks,  
Cameron

**camb**

Posts: 1  
Joined: 19 June 2013

### Re: The hardest sudokus (new thread)

Day **champagne** » Thu Jun 20, 2013 6:41 am

**camb** wrote:  
Hi Tarek,  
  
I was curious about whether some of the most difficult puzzles were machine generated. For example, I'm using a constraint-based search and find 00041 (ranked in q1's top five) to be exceptionally difficult:

"Label: HardestSudokuThread-00041;tarx0001;Fata\_Morgana"

Do you know whether this puzzle was handcrafted or machine generated?

Thanks,  
Cameron

Hi Cameron,

I let tarek answer for "fata morgana" (may be a pm would be better to be sure to touch him but you have to post more than 3 messages to be authorised to use a pm).

Generally speaking, the best people have done by hand IMO is to select a pattern. All the rest is computer work with several tasks

- generate a valid puzzle
- check it is a minimal one
- rate him

The tools vary, but the most commonly used has been the vicinity search to create new puzzles.  
Several ratings have been used, none has been really convincing as giving the right ranking. The data base of potential hardest is based on Sudoku Explainer ratings and "fata morgana" has not the necessary rating to enter the data base (and we know how to solve it "easily").

You seem to have a puzzle generator using internal filters. One interesting point, if you are looking for hard puzzles, is the throughput you can achieve with your process (which is not easy to define) compared to others.

### Re: The hardest sudokus (new thread)

Day **tarek** » Thu Jun 20, 2013 9:29 am

Hi Cameron & thanks Champagne for your addition.

The puzzle in question is machine generated but not completely. In that period of Hardest puzzles search; the strategy involved choosing a good starting puzzle & do a vicinity search, this search can be stopped at some stage if the results are fruitless with a different start(seed) puzzle. Finding these puzzle at random (even with a machine) is almost impossible. Handcrafting these puzzles from scratch is futile.

Tarek



**tarek**  
Posts: 3759  
Joined: 05 January 2006

### Re: The hardest sudokus (new thread)

Day **champagne** » Thu Jul 18, 2013 8:17 am

I tried to make an update of the potential hardest data base in the skfr project as usual.

Google has discarded that process, that should work till Jan 2014 where it existed.

After several failure, I moved to the new process and loaded the file in my "google drive space"

the link to that storage place is [here](#)

The file name is pot\_hardest\_13\_07.zip

This is just the update of the puzzles. I do my best to update in the near future all files of puzzles with exotic properties

**champagne**  
2017 Supporter

Posts: 7269  
Joined: 02 August 2007  
Location: France Brittany

### Re: The hardest sudokus (new thread)

Day **champagne** » Sat Jul 20, 2013 6:51 am

I started the update of the exotic properties for the potential hardest file.

all new files are in my "google drive space"

the link to that storage place is [here](#)

The file "file names phxx.txt" contains the names of the files already loaded or to come.

I am running a new complete check of the 10 logic using the last update of my code.  
I am also running a cells-base analysis , but I am not expecting results before about one month. The process is too low.

Meantime, I'll launch a revision of the multi fish potential which is one way to detect puzzles of interest and has a runtime not too high

### Re: The hardest sudokus (new thread)

Day **champagne** » Wed Oct 02, 2013 8:52 am

Many things happened during these months and meantime, the generation produced new potential hardest.

I just made an update of the data base and uploaded the new status of the base in the file ph\_13\_10. Updates of files containing exotic properties will come slowly without notice. Corresponding ph\_13\_07 files will be erased.

all new files are in my "google drive space"

the link to that storage place is [here](#)

here an abstract of the base-status.txt file contained in the ph\_13\_10.zip file

```
CODE: SELECT ALL
Changes in that update are mainly the new puzzles I found mostly in the 25 clues area, but with an entry in the 26 clues area and some puzzles with less clues.
The file contains currently 1096208 puzzles with about 100 000 new entries,
out of which 267821 are rated 11 and more.
The major fact here is the start of a systematic search in the 26 clues area.
An update of the exotic properties will come soon.
the count per number of clues is the following
clues_nb_previous
20_262_260
21_19525_9839
22_74134_68265
23_247220_233499
24_398992_385237
25_333130_282137
26_40164_663
As one can see, exploration for lower number of clues continues, but the count for 26 clues is now significant, although next months should bring more puzzles.
The 20 clues area seems covered with only 2 new entries. I got more than expected puzzles in the 21,23 area.
The 24 clues area had a poor yield and I have likely to look for fresh seeds in that area. It could be that the area is significantly covered
I prepared a table of high ratings I got so far
20_21_22_23_24_25_26
11.9_1_4_3
11.8_1_15_27_7
11.7_1_30_49_9_10_7
11.6_5_34_50_41_32_9
11.5_1_45_98_140_103_57_2
11.4_5_125_299_435_242_114_19
11.3_41_591_1080_1826_1739_894_176
11.2_73_911_2560_4065_5188_2568_456
11.1_61_1213_4717_13999_19383_10104_846
188_2985_8884_21325_25697_13753_1498
I find that table more and more interesting. Areas 25 clues and 26 clues have still a lot of potential.
For sure, highest ratings seem to be covered, but we have here a kind of numeric bias. The less given you have, the more candidates you should get and a tough clearing move has a good chance to use more candidates, what in serate gives a higher rating.
26 clues's area seems to be still able to produce many potential hardest puzzles.
```

### Re: The hardest sudokus (new thread)

Day **champagne** » Fri Dec 05, 2013 4:57 pm

I added a little more than 99 000 puzzles, stored in a separate file of my google drive "php13\_11".

As I did not work on the properties of these new puzzles, I only published additions (a kind of safety measure)  
I worked again in the 21-22 area, but I'll comment on that in another thread.

Most puzzles are in the 25\_26 clues areas

**champagne**  
2017 Supporter

Posts: 7269  
Joined: 02 August 2007  
Location: France Brittany

### Re: The hardest sudokus (new thread)

Day **champagne** » Tue Dec 31, 2013 9:00 am

**champagne** wrote:  
I added a little more than 99 000 puzzles, stored in a separate file of my google drive "php13\_11".

As I did not work on the properties of these new puzzles, I only published additions (a kind of safety measure)  
I worked again in the 21-22 area, but I'll comment on that in another thread.

Most puzzles are in the 25\_26 clues areas

New update in the same conditions, the last file php\_14\_01 has 135222 puzzles. The file php13\_11 has been cancelled  
A significant part of that lot is in the field 22 clues and is derived form the "exocet pattern" generation.  
Some puzzles have been added by mladen dobrichev.

Next update of the data base will not come before end of march.

Happy new year to all

**champagne**  
2017 Supporter

Posts: 7269  
Joined: 02 August 2007  
Location: France Brittany

### Re: The hardest sudokus (new thread)

Day **dobrichev** » Tue Dec 31, 2013 2:01 pm

The latest collection is the union of ph\_13\_10 and php\_14\_01 files, right?

If so, there are 8876 duplicated puzzles.  
The number of unique puzzles is 1231428.

Below is the distribution by solution grids.

**Hidden Text: Show**

Every second puzzle has brothers born in the same solution grid family.

Pattern distribution looks in similar way

**Hidden Text: Show**

**dobrichev**  
2016 Supporter

Posts: 1831  
Joined: 24 May 2010

### Re: The hardest sudokus (new thread)

Day **champagne** » Tue Dec 31, 2013 3:41 pm

**dobrichev** wrote:  
The latest collection is the union of ph\_13\_10 and php\_14\_01 files, right?

If so, there are 8876 duplicated puzzles.  
The number of unique puzzles is 1231428.

The full collection should be the union and the data base contains also 1231428 puzzles.

I surely made a mistake when I entered the filter for the complementary file.

I'll check that in March but at that time, I'll try to post a new full analysis

**champagne**  
2017 Supporter

Posts: 7269  
Joined: 02 August 2007  
Location: France Brittany

### Re: The hardest sudokus (new thread)

Day **champagne** » Sat Apr 05, 2014 9:20 am

I just made an update of the data base on 05 of late march 2014.

as for all new files , that update is in my "google drive space" with the name ph14\_04.zip

the link to that storage place is [here](#)

The file contains now 1 264 655 puzzles  
33 227 puzzles have been added since January, mainly in the 26 clues field.

I did not work since December on the exotic properties. On my side, this will come only in May. I have other constraints in April.

The clue count in the data base was not correct for several puzzles, especially in the 20\_22 clues field.

The data base has been adjusted. The statistics are now in line with the adjusted count

the count per clue in the data base is the following

```
CODE: SELECT ALL
20_77
21_107791
22_86274
23_254119
24_413391
25_355491
26_344419
more_183
Interesting is the distribution of highest ratings per clue.
The 26 clues field is far from being investigated (same somehow at a lowest degree for 24 and 25 clues),
but we can already have some feelings
```

```
CODE: SELECT ALL
11.9_20_21_22_23_24_25_26
11.8_1_15_26_8_13_8_1
11.7_31_59_8_34_10_1
11.6_1_38_59_40_34_10_1
11.5_46_99_138_102_75_12
11.4_130_39_332_251_156_49
11.3_1_627_1102_1763_1819_1095_539
11.2_2_989_2670_4900_5376_2839_1176
11.1_12_1263_4976_13961_18977_11389_3407
11_3_682_5042_17835_25094_14806_6178
20_3942_14320_38988_52265_29538_11362_159435
```

Due to the Sudoku Explainer rating rules, we have a direct effect of the number of candidates on the rating, not easy to quantify.

So IMO the results for 26 clues are not so far from the results for lower counts.

### Re: The hardest sudokus (new thread)

Day **petyo staykov** » Thu May 15, 2014 11:20 am

here's a new very difficult puzzle. It has ER/EP/ED 11.9,11.9,11.8

.8..31...  
5..7....  
2..9....  
9..3....  
7..2..3..  
..3..8..6  
...5...4  
....4..6.1.  
.....6.1

Good luck to all members of the forum.

Regards,  
Petyo Staykov

**petyo staykov**

Posts: 4  
Joined: 11 May 2014

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