The hardest sudokus (new thread)

Re: The hardest sudokus (new thread)

QUOTE

by **steven** » Thu Sep 22, 2011 10:16 am

> **champagne wrote:**
> If it catch your point, your findings is that in these four columns you must have r1c6=6 r3c6=4 .....
>
> Yes, this would follow from the eliminations
>
> **steven wrote:**
> 1) How did you come to that
>
> Brute force random tries, as usual
>
> **champagne wrote:**
> 2) If you don't have XSLIDO, I'll try it for you
>
> I dont have windows, so please.
>
> **steven wrote:**
> 3) you have to many cookeries, this is not something I am looking for in my solver
>
> Yes, its all but easy to show, how the eliminations can be made. But e.g. in 'champagne dry' there is a 4 unit elimination (if my program is right), which i guess must be easier than Elf's 11.8 step. If possible, i would like to classify puzzles with e.g. "can be solved with 5 units moves". I dont have a chance to check all possible 5 units moves, but i see good chances to find solutions with 6 unit moves in reasonable time for (almost ?) all puzzles. This is somewhat surprising for me. Before i thought, that hardest puzzles would need 8+ units for the hardest move.

Re: The hardest sudokus (new thread)

QUOTE

by **rank** » Thu Sep 22, 2011 11:09 am

> **steven wrote:**
> Since my program is very new and probably buggy, my question is, if someone can verify the eliminations in the 2 samples below (the second puzzle is from champagnes list of 18 hardest). Maybe this is possible with XSudo.
>
> r1c6<>4, r1c6<>5, r1c6<>7, r2c6<>8, r2c6<>7, r2c6<>9, r3c6<>8, r3c6<>1, r3c6<>4, r3c6<>5, r3c6<>8, r4c6<>7, r4c6<>8, r4c6<>4, r4c6<>9, r5c6<>6, r5c6<>8, r6c6<>7, r7c6<>6, r8c2<>3, r8c2<>6, r8c6<>6, r8c6<>7, r8c6<>8, r8c6<>2, r8c6<>3, r8c2<>6, r8c6<>9
>
> For your first puzzle, using only the unsolved cells in c2, c6, c8 and c9 as Xsudo inputs (aka base sets, strong inference sets), XSLIDO verifies all your eliminations.
>
> CODE: SELECT ALL
>
> ```
> +-----------------------+-----------------------+-----------------------+
> | 2     .     .         | .     .     .         | 7     6     5         |
> | .     .     .         | 8     .     .         | 9     .     .         |
> | .     .     .         | 7     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> +-----------------------+-----------------------+-----------------------+
> ```
>
> 27 Truths = (2457789) 12345789 12457789 12457789)
> 37 Links = (1r2b 3r2b 4r1d 5r1d 6r1b7 8r2b7 9r2d7 1d6r7 7b6r 23b8r 6b2 13b63 9b4 4b5 6b6 3b8)
> 18 Eliminations --> r1c6<>7, r1c6<>2, r1c6<>4, r1c6<>5, r1c6<>8, r2c6<>8, r2c6<>7, r2c6<>9, r3c6<>8, r3c6<>1, r3c6<>4, r3c6<>5, r3c6<>8, r4c6<>7, r4c6<>8, r4c6<>4, r4c6<>9, r5c6<>6, r5c6<>8, r6c6<>7, r7c6<>6, r8c2<>3, r8c2<>6, r8c6<>6, r8c6<>7, r8c6<>8, r8c6<>2, r8c6<>3, r8c2<>6, r8c6<>9
>
> IMO this scenario is unnecessarily complex. I say this because several of the base sets are not needed and because there are cannibalistic eliminations. In three cases, the cannibalistic eliminations cause XSLIDO to assign naked singles for even more eliminations.
>
> An interesting pattern is this embedded "5-rank logic set" with 18 base sets and 16 cover sets. As of now, I have no idea what makes this 5-rank pattern tick.
>
> CODE: SELECT ALL
>
> ```
> +-----------------------+-----------------------+-----------------------+
> | 2     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> | .     .     .         | .     .     .         | .     .     .         |
> +-----------------------+-----------------------+-----------------------+
> ```
>
> 27 Truths = (2457789) 12345789 12457789 12457789)
> 37 Links = (1r2b 3r2b 4r1d 5r1d 6r1b7 8r2b7 9r2d7 1d6r7 7b6r 23b8r 6b2 13b63 9b4 4b5 6b6 3b8)
> 18 Eliminations --> r1c6<>7, r1c6<>2, r1c6<>4, r1c6<>5, r1c6<>8, r2c6<>8, r2c6<>7, r2c6<>9, r3c6<>8, r3c6<>1, r3c6<>4, r3c6<>5, r3c6<>8, r4c6<>7, r4c6<>8, r4c6<>4, r4c6<>9, r5c6<>6, r5c6<>8, r6c6<>7, r7c6<>6, r8c2<>3, r8c2<>6, r8c6<>6, r8c6<>7, r8c6<>8, r8c6<>2, r8c6<>3, r8c2<>6, r8c6<>9
>
> I'll update with an image later, after I figure out to use tmpbz.com again.
>
> In the case of the second puzzle, the logic set is apparently too big for XSLIDO, and thus unable to verify your eliminations.

Re: The hardest sudokus (new thread)

QUOTE

by **champagne** » Thu Sep 22, 2011 12:44 pm

> **steven wrote:**
> Yes, its all but easy to show, how the eliminations can be made. But e.g. in 'champagne dry' there is a 4 unit elimination (if my program is right), which i guess must be easier than Elf's 11.8 step. If possible, i would like to classify puzzles with e.g. "can be solved with 5 units moves". I dont have a chance to check all possible 5 units moves, but i see good chances to find solutions with 6 unit moves in reasonable time for (almost ?) all puzzles. This is somewhat surprising for me. Before i thought, that hardest puzzles would need 8+ units for the hardest move.
>
> some comments:
>
> 1) champagne dry has an EXOCET pattern. This is usually a four floors structure, sometimes a three floors ("tata morgana", "trompe l'oeil"...)
>
> 2) The first puzzle is identified in my list as having a "rank 6 logic". In fact, my solver detected a "row based" rank 6 logic
>
> sets 2789R2 2789R4 2789R5 2789R7
> linksets 8bC2 7bC5 7bC8 2bC9 D2 E2 C4 E4 A5 C6 A7 C7
>
> rank seems to have another one. My solver does not look for that pattern
>
> 3) the second puzzle has a pure rank 0 logic but using 5 rows
>
> here is XSLIDO output for that logic
>
> CODE: SELECT ALL
>
> ```
> +-----------------------+-----------------------+-----------------------+
> | 16(9) 16(289) 2       | .     .     .(256)  6(25)   | .     16(8)   16(589) |
> | 1467  .       478     | 1     .     .       9       | 3     148     1348-8  |
> | 4567(5) 467(289) .(1267) | .(1267) .     .(1267) .(1267)(1267) 5(589)  .(4678) |
> +-----------------------+-----------------------+-----------------------+
> | 2     .       .       | 4     .     .       .       | 1489  .       1467-8  |
> | 7(59) 4(19)   .       | .     .(59) 8(9)    .       .     .       .(1467) |
> | 8     .(67)   5(67)   | 2(67) 2(67) .       1267-2) 1     1249    1467    |
> +-----------------------+-----------------------+-----------------------+
> | 1(57) 1(78)   4       | 3     .     .       9       .(258)  1(57)   1(57)   |
> | 1567  1567    .(267   | 235   .     2(6   8       1(25    1(25    .(25    |
> | 9(59) (269)   (2569)  | 1     .     .       4(25)   6       3(8)    3(25)   |
> +-----------------------+-----------------------+-----------------------+
> ```
>
> some comments:
>
> 1) champagne dry has an EXOCET pattern. This is usually a four floors structure, sometimes a three floors ("tata morgana", "trompe l'oeil"...)
>
> 2) The first puzzle is identified in my list as having a "rank 6 logic". In fact, my solver detected a "row based" rank 6 logic
>
> sets 2789R2 2789R4 2789R5 2789R7
> linksets 8bC2 7bC5 7bC8 2bC9 D2 E2 C4 E4 A5 C6 A7 C7
>
> rank seems to have another one. My solver does not look for that pattern
>
> 3) the second puzzle has a pure rank 0 logic but using 5 rows
>
> here is XSLIDO output for that logic
>
> CODE: SELECT ALL
>
> ```
> +-----------------------+-----------------------+-----------------------+
> | 16(9) 16(289) 2       | .     .     .(256)  6(25)   | .     16(8)   16(589) |
> | 1467  .       478     | 1     .     .       9       | 3     148     1348-8  |
> | 4567(5) 467(289) .(1267) | .(1267) .     .(1267) .(1267)(1267) 5(589)  .(4678) |
> +-----------------------+-----------------------+-----------------------+
> | 2     .       .       | 4     .     .       .       | 1489  .       1467-8  |
> | 7(59) 4(19)   .       | .     .(59) 8(9)    .       .     .       .(1467) |
> | 8     .(67)   5(67)   | 2(67) 2(67) .       1267-2) 1     1249    1467    |
> +-----------------------+-----------------------+-----------------------+
> | 1(57) 1(78)   4       | 3     .     .       9       .(258)  1(57)   1(57)   |
> | 1567  1567    .(267   | 235   .     2(6   8       1(25    1(25    .(25    |
> | 9(59) (269)   (2569)  | 1     .     .       4(25)   6       3(8)    3(25)   |
> +-----------------------+-----------------------+-----------------------+
> ```
>
> CODE: SELECT ALL
>
> ```
> 72 Candidates,
>
> 19 Truths = (2913579 5913579 6913579 9913579)
>
> 19 Links = (5b1 28b2 25c8 8c8 25B8b3 1r5 3r3d7 5r4 7r7 9r3)
>
> 18 Eliminations --> r3c3<>7, r6c6<>2, r6c2<>9, r6c2<>2, r8c1<>5, r2c6<>8, r3c4<>3,
>
> r3c7<>4, r4c8<>9, r5c4<>7, r6c6<>5, r7c7<>1,
> ```
>
> EDIT : something is wrong in that table; Truths should appear as 2589 in rows 1,3,5,7,9
> we have 19 truths
> Links are ok
>
> My solver does not look for more than 4 rows to build a SLG.
>
> Here we have 5 rows, but the process is the same;
>
> The floors used here are complementary to eleven's proposal.
> Very often, when a group of floors is active, the complementary set is active also.
>
> The 4 floors is easier to build and more efficient.
>
> champagne

Re: The hardest sudokus (new thread)

QUOTE

by **steven** » Thu Sep 22, 2011 5:39 pm

Hi,

I had a look at the post where a short list of "potential hardest" was given.

Entry 5416 is shown with high potential for floors 2589 and floors 13467.

Likely other entries with similar potential will disappear as well.

Next update will include the filter for the found "rank 0 logic" for that puzzle.

champagne

Re: The hardest sudokus (new thread)

QUOTE

by **steven** » Thu Sep 22, 2011 6:07 pm

Thanks to Ron and champagne.

Now I have limited, if i could find 6 unit solutions for the 11.8+ and champagne's 18 puzzles. They were rather quickly found for all but this one (which i will try again later):

CODE: SELECT ALL

```
1.....9.5.1...3..8..34...1.5.....9..8..2...6..7.3...4..8.2.....8..7..6.|341;elev|11.1|11.1|10.8;7
```

Re: The hardest sudokus (new thread)

QUOTE

by **rank** » Thu Sep 22, 2011 9:19 pm

> **champagne wrote:**
>
> CODE: SELECT ALL
>
> ```
> 72 Candidates,
>
> 19 Truths = (2913579 5913579 6913579 9913579)
>
> 19 Links = (5b1 28b2 25c8 8c8 25B8b3 1r5 3r3d7 5r4 7r7 9r3)
>
> 18 Eliminations --> r3c3<>7, r6c6<>2, r6c2<>9, r6c2<>2, r8c1<>5, r2c6<>8, r3c4<>3,
>
> r3c7<>4, r4c8<>9, r5c4<>7, r6c6<>5, r7c7<>1,
> ```
>
> EDIT : something is wrong in that table; Truths should appear as 2589 in rows 1,3,5,7,9
> we have 19 truths
> Links are ok
>
> I see nothing wrong in that table. Four candidate values in 5 rows would be 20 truths. R7c5 already holds digit <9>, leaving 19 truths.

Re: The hardest sudokus (new thread)

QUOTE

by **champagne** » Thu Sep 22, 2011 7:44 pm

> **rank wrote:**
>
> **champagne wrote:**
>
> CODE: SELECT ALL
>
> ```
> 72 Candidates,
>
> 19 Truths = (2913579 5913579 6913579 9913579)
>
> 19 Links = (5b1 28b2 25c8 8c8 25B8b3 1r5 3r3d7 5r4 7r7 9r3)
>
> 18 Eliminations --> r3c3<>7, r6c6<>2, r6c2<>9, r6c2<>2, r8c1<>5, r2c6<>8, r3c4<>3,
>
> r3c7<>4, r4c8<>9, r5c4<>7, r6c6<>5, r7c7<>1,
> ```
>
> EDIT : something is wrong in that table; Truths should appear as 2589 in rows 1,3,5,7,9
> we have 19 truths
> Links are ok
>
> I see nothing wrong in that table. Four candidate values in 5 rows would be 20 truths. R7c5 already holds digit <9>, leaving 19 truths.
>
> rgh:
>
> I am not so familiar with XSLIDO notation and I mirored the Truths
>
> champagne
>
> Last edited by **champagne** on Tue Sep 27, 2011 8:10 am, edited 1 time in total.

Re: The hardest sudokus (new thread)

QUOTE

by **steven** » Fri Sep 23, 2011 7:35 am

The puzzle above (elev.11.1.11.1,10.8,7) also resisted 10 more tries to find a 6 unit solution. Only 8 candidates could be eliminated (r7c1c2, 2r1c6, 2r1c6, 5r9c5, 7r2c1, 5r6c7, 9r7c7, 5r9c5). So in this respect it is the hardest known of the world.

On the other hand for 10 the 36 11.8+ puzzles (including 11.901.11.902.60;elev.15) and for champagne's "19 hardest" solutions with 5 unit moves could be found in the first try.

Re: The hardest sudokus (new thread)

QUOTE

by **rank** » Fri Sep 23, 2011 10:18 am

> **steven wrote:**
> The puzzle above (elev.11.1.11.1,10.8,7) also resisted 10 more tries to find a 6 unit solution.
>
> **steven**, would you please clarify the meaning of "6 unit solution?" Six rows? Six columns? Six boxes? Any combination of six rows, columns and boxes? And how do candidates of one cell, as one strong-inference-set, fit into this picture?

Re: The hardest sudokus (new thread)

QUOTE

by **steven** » Fri Sep 23, 2011 12:57 pm

> **rank wrote:**
>
> **steven wrote:**
> The puzzle above (elev.11.1.11.1,10.8,7) also resisted 10 more tries to find a 6 unit solution.
>
> **steven**, would you please clarify the meaning of "6 unit solution?" Six rows? Six columns? Six boxes? Any combination of six rows, columns and boxes? And how do candidates of one cell, as one strong-inference-set, fit into this picture?
>
> I mean subgrids, defined by 6 units (rowsfcolumnsfbox), as i posted them in the 2 samples (with 4 units, could be boxes as well). Any candidate, for which it is not not possible to fill the subgrids according to the sudoku rules is eliminated.
>
> E.g. this is a 4 unit subgrid (of champagne dry) consisting of box 1 and columns 3,4,7, where 8r2c4 can be eliminated.
>
> CODE: SELECT ALL
>
> ```
> +-----------------------+-----------------------+-----------------------+
> | .     8     .         | 12345 .     .         | 1234  .     .         |
> | 1     5     .         | 12348 .     .         | 1248  .     .         |
> | 1234  123   9         | 12348 .     .         | 123478 .    .         |
> +-----------------------+-----------------------+-----------------------+
> | 1258  .     128       | 168   678   9         | .     278   .         |
> | 12368 1236  7         | 9     3468  1468      | 5     .     468     |
> | 2568  2856  356       | 1     3468  2         | 4678  .     4678    |
> +-----------------------+-----------------------+-----------------------+
> | 12348 12367 8         | 5     467   2467      | 9     .     467     |
> | 1248  1267  1269      | 3     4678  1467      | 47    5     .       |
> | 1458  12679 1269      | 468   4678  3         | 178   .     678     |
> +-----------------------+-----------------------+-----------------------+
> ```
>
> 22 groups locked, 36 cells locked, 1780 candidates could be eliminated
>
> CODE: SELECT ALL
>
> ```
> +-------+-------+-------+
> | 9     8     .| 12345 .     .| 1234  .     .|
> | 7     6     .| 12348 .     .| 1248  .     .|
> | 1234  123   9| 12348 .     .| 123478 .    .|
> +-------+-------+-------+
> | 1258  .     .| 168   678   9| .     278   .|
> | 12368 1236  7| 9     3468  1468| 5     .     468|
> | 2568  2856  356| 1     3468  2| 4678  .     4678|
> +-------+-------+-------+
> | 12348 12367 8| 5     467   2467| 9     .     467|
> | 1248  1267  1269| 3     4678  1467| 47    5     .|
> | 1458  12679 1269| 468   4678  3| 178   .     678|
> +-------+-------+-------+
> r2c4<>8
> ```
>
> If a "subgrid" consists of all 9 rows (or columns/boxes), then all wrong candidates can be eliminated.

Re: The hardest sudokus (new thread)

QUOTE

by **tarek** » Sat Sep 24, 2011 11:07 am

Hi all,

Apologies for not being up to speed with what has been posted here (work commitments).

Can I propose that Champagne, eleven, ... use a single post which can be updated regular by them to list what they/their solvers consider as hardest.

These posts can then be easily accessed from a link in the 2nd post of this thread when I update it. (similar to what Ravel, JPF and others have done). The link would be something like "Champagne's hardest Sudoku puzzles ...."

tarek

P.S. I can understand champagne if you're too busy today to read this: Joyeux Anniversaire À vous

Re: The hardest sudokus (new thread)

QUOTE

by **steven** » Sat Sep 24, 2011 5:56 pm

> **tarek wrote:**
> Can I propose that Champagne, eleven, ... use a single post which can be updated regular by them to list what they/their solvers consider as hardest.
>
> I am not capable of rating puzzles. My statement "hardest in this respect" does not mean more than, that its best for this special "filter".

Re: special "filter"

QUOTE

by **tarek** » Sat Sep 24, 2011 10:23 pm

> **steven wrote:**
> I am not capable of rating puzzles. My statement "hardest in this respect" does not mean more than, that its best for this special "filter".
>
> I'll put a link to a list that categorizes hardest puzzles according this "filter" if you create one.
>
> tarek

Re: The hardest sudokus (new thread)

QUOTE

by **champagne** » Tue Sep 27, 2011 8:07 am

> **tarek wrote:**
> Hi all,
>
> Apologies for not being up to speed with what has been posted here (work commitments).
>
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>
> These posts can then can be easily accessed from a link in the 2nd post of this thread when I update it. (similar to what Ravel, JPF and others have done). The link would be something like "Champagne's hardest Sudoku puzzles ...."
>
> tarek
>
> P.S. I can understand champagne if you're too busy today to read this: Joyeux Anniversaire À vous
>
> hi tarek,
>
> I have some days off, with other family events that just "anniversaire".
>
> In principle, I have no problem to follow you.
> In the data base I maintain, I'll add the file of "nothing special" with the appropriate evaluation of "forecast difficulty".
>
> I can also put in a specific post the short list corresponding to these puzzles.
>
> I'll be back home next Thursday and have then more time to open the discussion.
>
> champagne

Re: The hardest sudokus (new thread)

QUOTE

by **champagne** » Tue Sep 27, 2011 8:17 am

> **tarek wrote:**
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