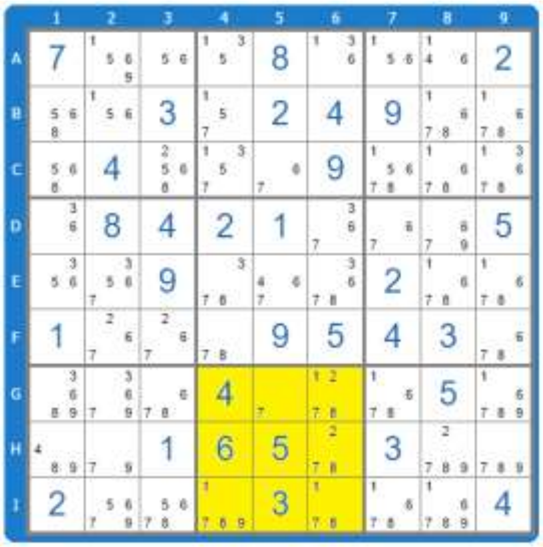
SDE Interview coding question

In the game of Sudoku there is a 9 x 9 grid in which there are “rows of 9 cells”, “columns of 9 cells” and 3 x 3 “blocks of 9 cells”. To solve a board correctly each cell must contain a single number 1-9 such that there are no duplicate numbers in any particular row, column or block. You can find more information about Sudoku here.

One way to solve a Sudoku board is to create a list of “hints” for each empty cell that indicates the possible valid entries that the cell can contain. For example (considering only a single row):

2	5	3	7	9		1	4	6

The only possible missing number in this row is 8 so the hint for the empty cell would be 8. Similarly for the board below column 5 has missing numbers 4, 6, and 7 but the highlighted block GHI456 already includes the numbers 4 and 6, so 7 is the only choice for G5.



	1	2	3	4	5	6	7	8	9
A	7	1 5 6 9	5 6	1 3 5	8	1 3 6	1 5 6	1 4 6	2
B	5 6 8	1 5 6	3	1 5 7	2	4	9	1 6 7 8	1 6 7 8
C	5 6 8	4	2 5 6 8	1 3 5 7	6 7	9	1 5 6 7 8	1 6 7 8	1 3 6 7 8
D	3 6	8	4	2	1	3 6 7	6 7	6 7 9	5
E	3 5 6	3 5 6 7	9	3 7 8	4 6 7	3 6 7 8	2	1 6 7 8	1 6 7 8
F	1	2 6 7	2 6 7	7 8	9	5	4	3	6 7 8
G	3 6 8 9	3 6 7 9	6 7 8	4	7	1 2 7 8	1 6 7 8	5	1 6 7 8 9
H	4 8 9	7 9	1	6	5	2 7 8	3	2 7 8 9	7 8 9
I	2	5 6 7 9	5 6 7 8	1 7 8 9	3	1 7 8	1 6 7 8	1 6 7 8 9	4

Exercise:

Input:

You may choose to use either of the following input formats:

- A 9 x 9 array of integers where the array reference [0,0] represents cell A1 in the example above.
- A string that represents the board from left to right, top to bottom. For example the above sample board would be represented by the string

```
7...8...2..3.249...4...9....8421...5..9...2..1...9543....4...5...165.3..2...3...4
```

Note that each cell can be represented by the numbers 1-9 and . indicates that the cell is blank.

Requirements:

- Design a data structure that will store all the possible “hints” for all the cells in the array.
- Write a method that will determine all the valid hints for each empty cell. The list of hints for a cell that already contains a solution (number 1-9) should be empty.
- Output should look something like this:

```
[A,2] = 1,5,6,9
[A,3] = 5,6
…
[I,8] = 1,6,7,8,9
```

- Bonus requirement: Determine if the input board has any errors and define which errors you have detected.

Testing:

- Provide positive and negative test cases that will prove that your code works. These may be in descriptive form, text representations of sample boards you feel prove your code works, or they may be unit test code.

Deliverables:

All the source code for the solution you create. This should include

- The “product” code or solution including comments
- Any code you create to generate or execute your test cases
- Anything else you might like to include

Notes:

- You may approach this problem in whatever language you like.
- The solution must be able to compile using an industry standard compiler for the language you choose to use.
- You must NOT include a compiled version of your solution but you must include any project files that might be necessary to produce a compiled version of the code.
- If there are a large number of files involved in your solution please ZIP them and send a single zip file. Please do not use RAR as our firewall will block .RAR attachment
- All the code you produce MUST be entirely your own work.
- If you have any questions about this task please feel free to email me.
- There is no need to create any UI or any kind of visual representation of the board. The internal data structure you design will be sufficient.
- The above picture should be consider as a single example of a valid Sudoku board and not the only board your code it expected to work with.