CSC148-Section:L0301/L0401 Week#5-Monday

Instructed by

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Office hours: Wednesday 11-1, BA2230.

Slides adapted from Professor Danny Heap course material winter17

Computer Science
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Announcements

- Midterm #1: Wednesday in Exam Center

Possible test topics:

- Class design (main noune/verbs/ attributes)
- Special methods (__init__ /__str__/__eq__ etc)
- Inheritance
  - Subclasses
    - declare class Son(Father)
    - Inherit methods -> use unchanged
    - Extend methods -> use, then add some bits
    - Override -> replace completely

Possible test topics:

- Testing, exceptions
  - We will not ask you to write unittest classes or methods
  - Know exception hierarchey
- ADTs, stacks, queues, sacks
  - Familiar with add/remove/is_empty
- Linked Lists
  - Modify LL
  - Walk LL

Possible test topics:

- Write Docstrings
- Read Docstrings
- Your code should fit the space provided. If not think about your approach.

valid sudoku

- what makes a sudoku square valid?

5	3	4	6	7	8	9	1	2
6	7	2	1	9	5	3	4	8
1	9	8	3	4	2	5	6	7
8	5	9	7	6	1	4	2	3
4	2	6	8	5	3	7	9	1
7	1	3	9	2	4	8	5	6
9	6	1	5	3	7	2	8	4
2	8	7	4	1	9	6	3	5
3	4	5	2	8	6	1	7	9

valid sudoku

- what makes a sudoku square valid?

- valid rows
- valid columns
- valid subsquares

5	3	4	6	7	8	9	1	2
6	7	2	1	9	5	3	4	8
1	9	8	3	4	2	5	6	7
8	5	9	7	6	1	4	2	3
4	2	6	8	5	3	7	9	1
7	1	3	9	2	4	8	5	6
9	6	1	5	3	7	2	8	4
2	8	7	4	1	9	6	3	5
3	4	5	2	8	6	1	7	9

code it!

- Follow: **Top – down** design
  - Divide the work into smaller problems
  - Write a method for each smaller problem
  - Make each method readable not too many lines
    - If a method implementation requires you to scroll down your screen to read it, it means it is long make it shorter by building helper methods.
      - This **reduces the errors** in your code and **make it readable**

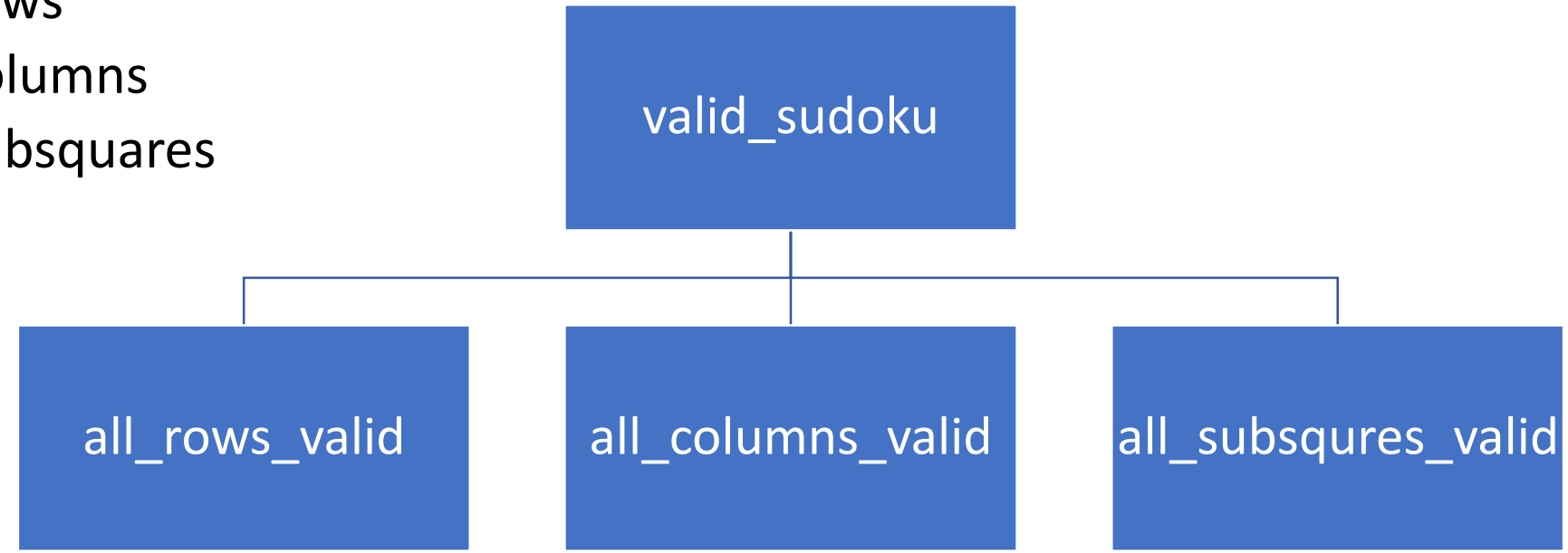
Top – down design

- Create an example sudoku grid
- Create digit set

```
# an example of a grid, for testing
_GRID = [[5, 3, 4, 6, 7, 8, 9, 1, 2],
         [6, 7, 2, 1, 9, 5, 3, 4, 8],
         [1, 9, 8, 3, 4, 2, 5, 6, 7],
         [8, 5, 9, 7, 6, 1, 4, 2, 3],
         [4, 2, 6, 8, 5, 3, 7, 9, 1],
         [7, 1, 3, 9, 2, 4, 8, 5, 6],
         [9, 6, 1, 5, 3, 7, 2, 8, 4],
         [2, 8, 7, 4, 1, 9, 6, 3, 5],
         [3, 4, 5, 2, 8, 6, 1, 7, 9]]

# an example of a digit_set for testing
_DIGIT_SET = {1, 2, 3, 4, 5, 6, 7, 8, 9}
```

Top – down design

- what makes a sudoku square valid?
  - valid rows
  - valid columns
  - valid subsquares



Top – down design

```
def valid_sudoku(grid: list[list], digit_set: set) -> bool:
    """ Return whether grid represents a valid,
    complete sudoku.

    Assume grid is square (as many rows as columns)
    and has the same number of rows as elements of
    digit_set.
    >>> valid_sudoku(_GRID, _DIGIT_SET)
    True
    >>> g = [[x for x in row] for row in _GRID]
    >>> g[0][1] = 5
    >>> valid_sudoku(g, _DIGIT_SET)
    False
    """
```

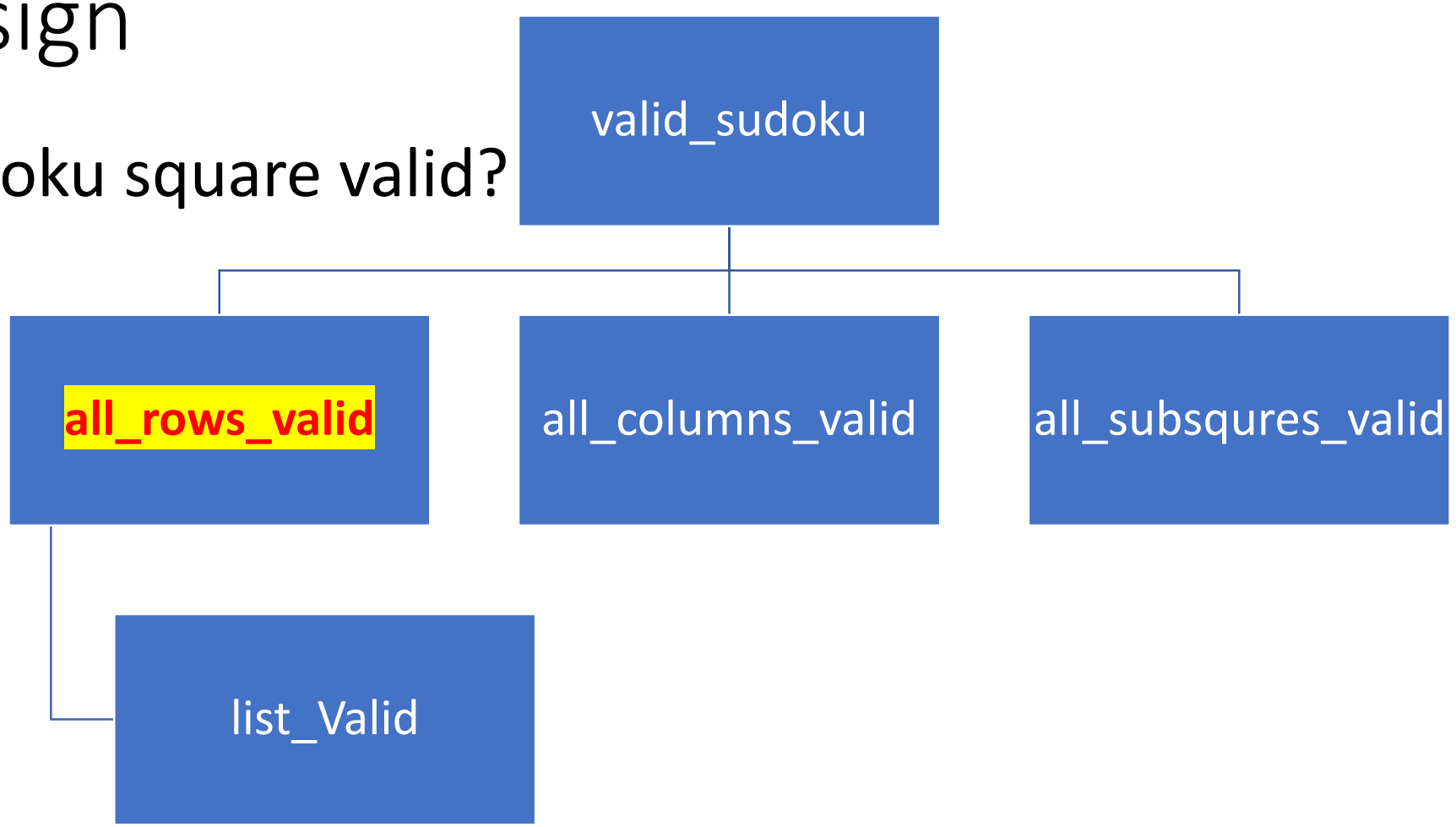
Top – down design

- Create an example

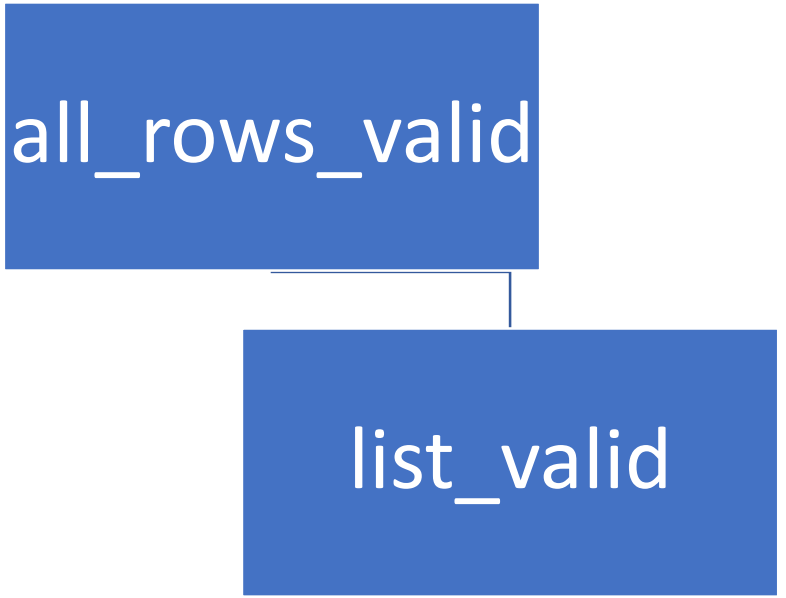
```
def valid_sudoku(grid: list[list], digit_set: set) -> bool:
    #insures we have square grid num cols == num rows
    assert all([len(r) == len(grid) for r in grid])
    #insures grid len == digit set
    assert len(grid) == len(digit_set)
    #call methods that will implemented later
    return (_all_rows_valid(grid, digit_set) and
            _all_columns_valid(grid, digit_set) and
            _all_subsquares_valid(grid, digit_set))
```

Top – down design

- what makes a sudoku square valid?
  - valid rows
  - valid columns
  - valid subsquares



all_rows_valid



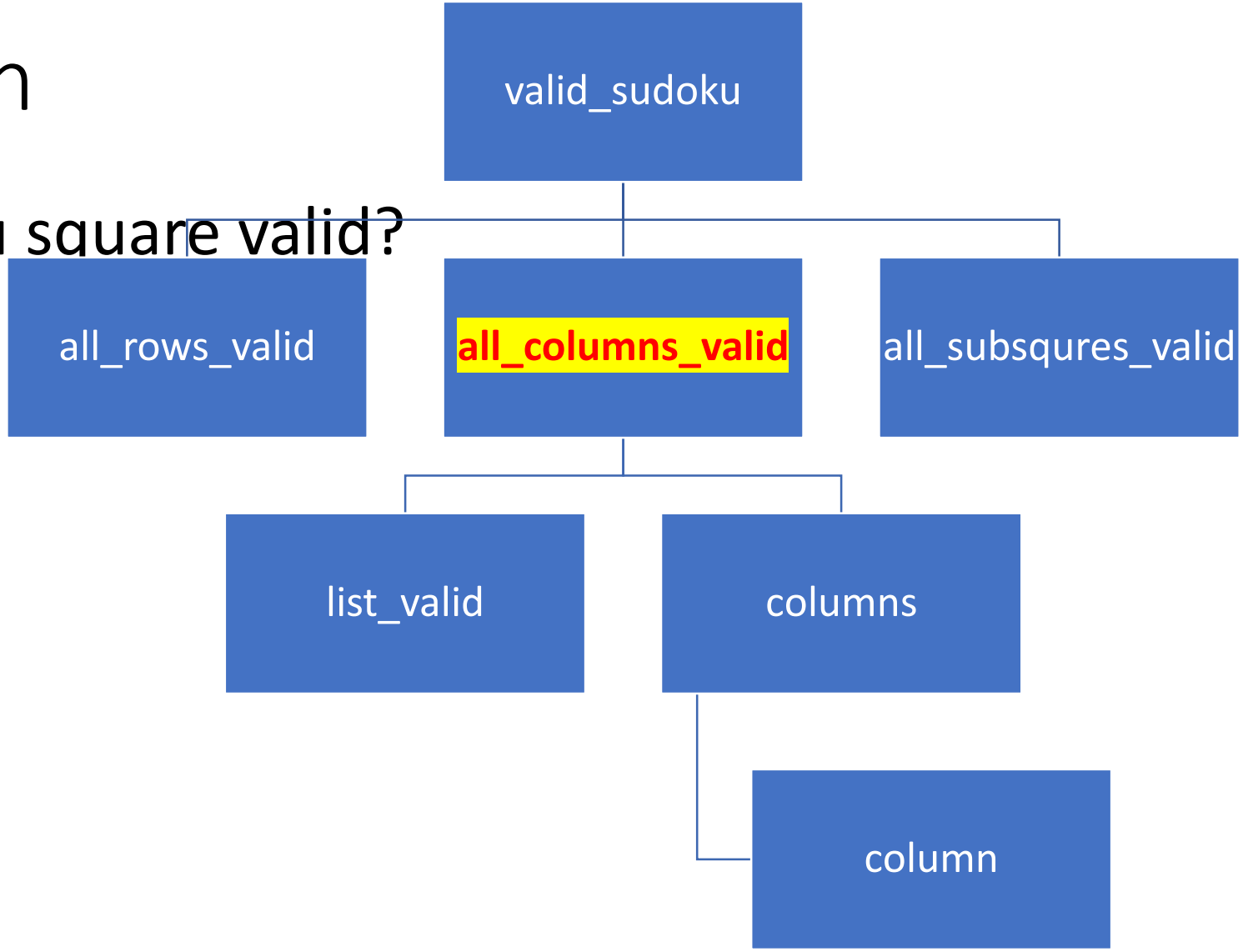

```
def _all_rows_valid(grid, digit_set):

    return all([_list_valid(r, digit_set) for r in grid])
```

list_Valid

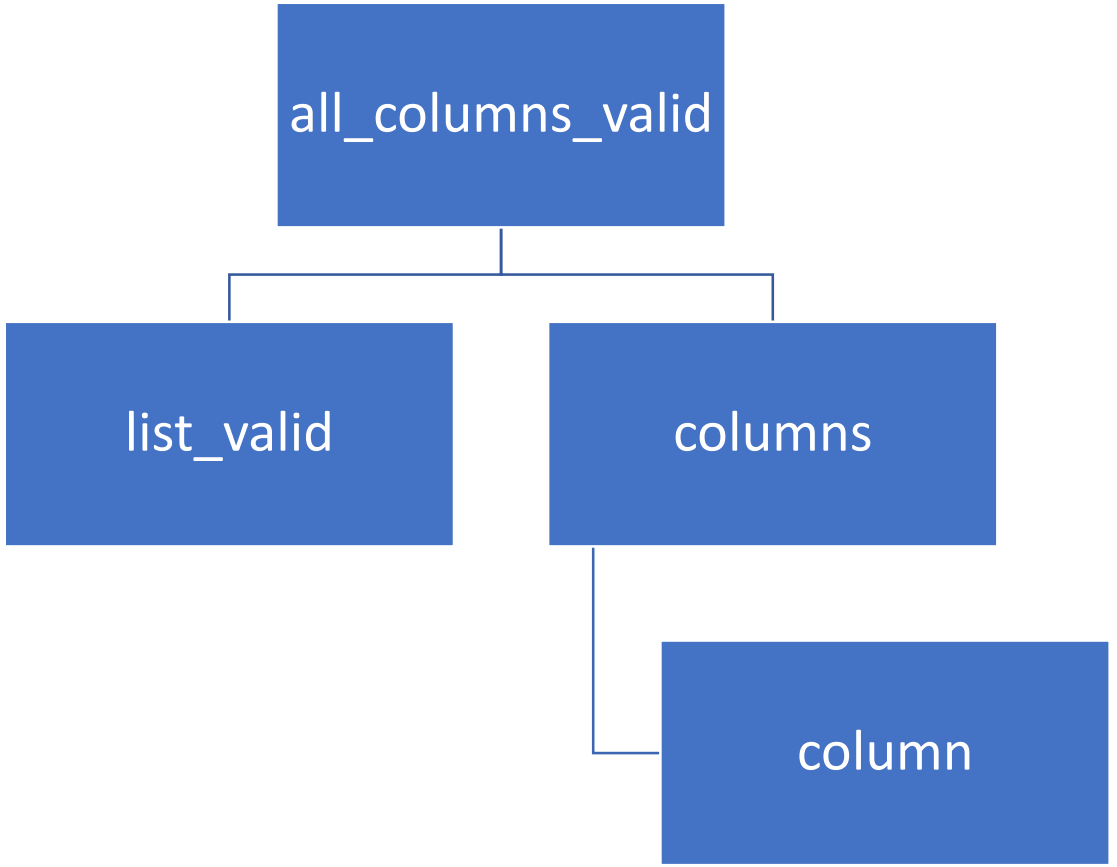
```
def _list_valid(r, digit_set):
    return set(r) == digit_set
```

Top – down design

- what makes a sudoku square valid?
  - valid rows
  - valid columns
  - valid subsquares



all_columns_valid




```
def _all_columns_valid(grid, digit_set):

    return all([_list_valid(c, digit_set) for c in _columns(grid
```

columnS

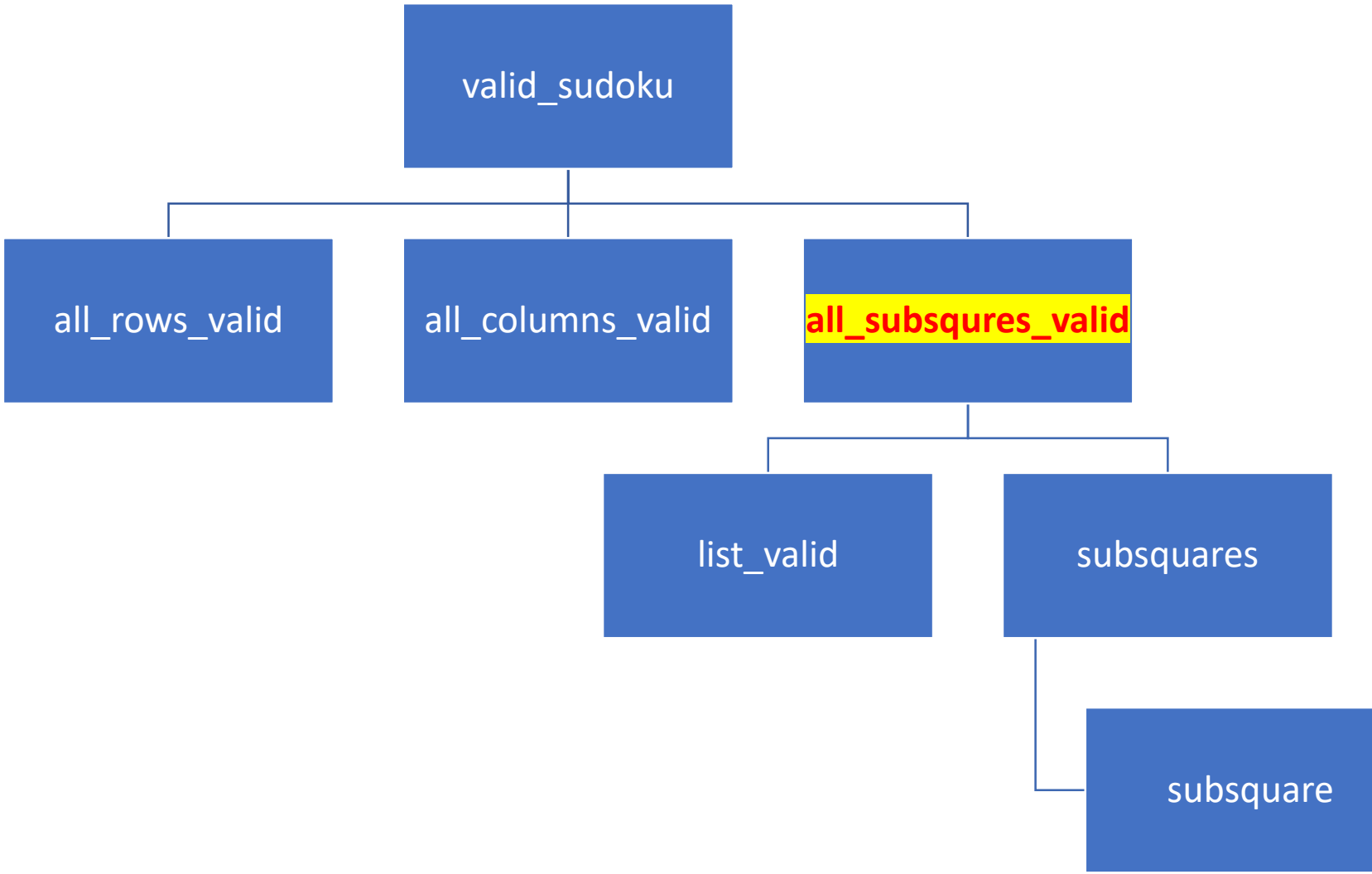
```
def _columns(grid):

    return [_column(i, grid) for i in range(len(grid))]
```

column

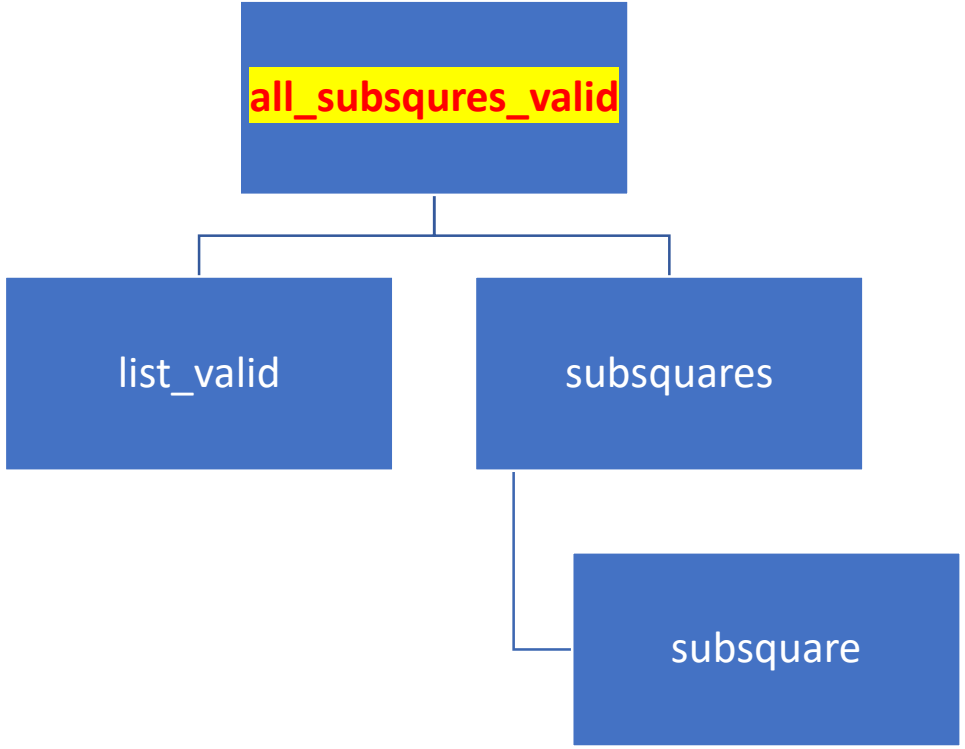
```
def _column(i, grid):
    return [r[i] for r in grid]
```

Top – down design

- what makes a sudoku square valid?
  - valid rows
  - valid columns
  - valid subsquares



all_subsqures_valid




```
def _all_subsquares_valid(grid, digit_set):

    return all([_list_valid(s, digit_set)
                for s in _subsquares(grid)])
```