Documentation:

There are many different methods that we use to specify a location on the board. They are all often convenient for different reasons. The three ways of representing a location on the board are:

- *human readable:* e.g. a1. This is the normal chess lingo. It is used for I/O.
- *2d grid*: e.g. (1,1). This is useful for specifying moves.
- *flattened grid*: e.g. 4. The board is stored as a string. this is kind of nice, but maybe was a bad idea. Think of it as an imutable 1d array though (because that's what it is).

The transformations between states are depicted in the following diagram:

$$\text{Human Readable} \underset{\xrightarrow{update}}{\xleftarrow{humanify}} \text{2d grid} \underset{\xrightarrow{ij\_to\_idx}}{\xleftarrow{idx\_to\_ij}} \text{1d grid}$$

Here is an outline of the important functions:
humanifty:

$$(i,j) \quad \mapsto \quad \textbf{chr}(\textbf{ord}(\text{`a'})+j)+\textbf{str}(4-i)$$

update: (note that this function is "in-place")

$$h_0h_1 \quad \mapsto \quad (4-\textbf{int}(h_1),\textbf{ord}(h_0)-\textbf{ord}(\text{`a'}))$$

ij_to_idx:

$$(i,j) \quad \mapsto \quad 4i+j$$

idx_to_ij:

$$\text{idx} \quad \mapsto \quad \textbf{divmod}(\text{idx})$$

Here is what the grid looks like:

4	(0,0)=0	(0,1)=1	(0,2)=2	(0,3)=3
3	(1,0)=4	(1,1)=5	(1,2)=6	(1,3)=7
2	(2,0)=8	(2,1)=9	(2,2)=10	(2,3)=11
1	(3,0)=12	(3,1)=13	(3,2)=14	(3,3)=15
	a	b	c	d