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CSC 411: Assignment 2
Design Document - Array2

1. What is the abstract thing you are trying to represent?

The main abstract thing I am trying to represent is the creation of a two dimensional array structure that will be used later in the assignment to generate a sudoku board and then check the validity of the board itself. The two dimensional array could be portrayed in a linear fashion or (for lack of a better term) in a two dimensional way. For the purpose of this assignment I'm going to approach the array as having a number of columns, with associated rows linked to each column.

2. What functions will be offered, and what are the contracts of that those functions must meet?

- Constructor:
  - This function will initialize a new two dimensional array; accepting a height and width of usize values. As well as an initial value of type T. This constructor will return Self (The array of Row x Width length).
- Iterator Function: By Row Major
  - This function will initiate iteration through a series of values within a *row*. It will be passed a reference of the array2 object. It will return an iterator of a given type (T) that will allow traversal over a sequence of values. (More on this will be relevant after Tuesday lecture)
- Iterator Function: By Col Major
  - Similar as above; but for column major. This function will initiate iteration through a series of values within a *col.* It will be passed a reference of the array2 object. It will return an iterator of a given type (T) that will allow traversal over a sequence of values.
- Getter:
  - This function will take two values of type usize (Row/Col) which will be used to either; return the data at the appropriate coordinates or return an Option<&T> if the data is out of bounds.
- Setter:
  - This function is similar to the getter in the sense that it will take a Row/Col of type usize. However, it will also take a value of a given type (T). The function will then set the specified coordinates to the new value and return a boolean to confirm the modification. Or it will return a false boolean if the coordinates were out of bounds.

4. What representation will you use? What invariants will it satisfy? (This question is the most important for precise answer)

This will primarily be done via a Vector containing Vectors of a given Type.

- Vec<Vec<T>>

The key to properly utilizing this representation is through the use of the representation variant which will effectively be using the formula of width * height + column to access a specific element within our Vector of vectors. This can then allow us to iterate through (either by row or column) and check if the current (row or column) is a valid sequence.