Data structure specification - Two-dimensional array

The implemented data structure is suitable for storing and handling a two-dimensional array. Its most important features:

• All items are stored

• The dimensions are known within the data structure

• Efficient memory management

• Stable operation even with large amounts of data

• Intuitive

The data structure is called the matrix. The size of the maximum two-dimensional array that can be stored is 10000\*10000. The elements can be integers from the interval [-231 , 231 - 1].

Operations with the data structure

• Creation

An n\*m, square or empty matrix can be reserved.

Prerequisites:

The specified size(s) of the array are positive integer(s) or not larger than 10000.

Postconditions:

If the specified size is correct, a two-dimensional array is created in memory.

• Liberation

Frees the specified matrix.

Prerequisites:

The matrix must exist.

Postconditions:

The reserved space in the memory is freed.

• Resizing

An existing matrix can be resized.

Prerequisites:

The given dimensions correspond to the limitations of the data structure.

Postconditions:

The number of rows and columns of the specified two-dimensional array changes according to the dimensions.

• Initialization

The matrix can be filled with zero or a desired value.

Prerequisites:

The specified value must be storable in the matrix.

Postconditions:

All elements of the array take the value of the specified integer.

• Size query

The current dimensions of the matrix can be queried.

Prerequisites:

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Postconditions:

Returns the number of rows or columns of a two-dimensional array.

• Value query

The value of an element can be queried.

Prerequisites:

The specified index is the position of an existing element in the matrix.

Postconditions:

Returns the value at index.

• Value setting

Writes the specified value at the specified index.

Prerequisites:

The specified index is the position of an existing element in the matrix.

The specified value can be stored in the matrix.

Postconditions:

The value of the element at the index is changed.

• Copy

Copies a matrix into another matrix.

Prerequisites:

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Postconditions:

The second matrix will be a copy of the first. If it didn't exist, it will be created.

• Rotates

Rotates the matrix 90 degrees to the right or left. It does not matter if the matrix is ​​not square.

Prerequisites:

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Postconditions:

The matrix is ​​rotated to the left or right, thereby changing the order of the elements.