All symbols stand for nonnegative integers.

Let \((n_1, n_2, \ldots, n_d)\) be the dimensions of the array, size of the array is \(N = n_1 n_2 \cdots n_d\) elements.

An element of the array has index \((i_1, i_2, \ldots, i_d)\), \(0 \leq i_k < n_k\), \(1 \leq k \leq d\).

Elements of the array are stored in the memory in the lexicographic order: \((i_1, i_2, \ldots, i_d) \leq (j_1, j_2, \ldots, j_d)\) if and only if \(i_k \leq j_k\) for some \(k\), \(1 \leq k \leq d\) and \(i_l = j_l\) for \(l > k\), and the position of the element with index \((i_1, i_2, \ldots, i_d)\) is \(m(i_1, i_2, \ldots, i_d) = i_1 + n_1(i_2 + n_2(i_3 \ldots n_{d-1}i_d) \ldots)\).

Let \(0 \leq k \leq d\): i) the set of the elements with indices \((i_1, i_2, \ldots, i_d)\) such that \(0 \leq i_k < n_k\), \(i_l\) fixed for \(l \neq k\), is called row. ii) the set of the elements with indices \((i_1, i_2, \ldots, i_d)\) such that \(i_k\) fixed, \(0 \leq i_l < n_l\) for \(l \neq k\), is called slice.

Hence row is a 1−dimensional orthogonal section of the array, slice is a \(d−1\)−dimensional orthogonal section of the array.

**How to traverse row:**

\[
\text{for}(i = 0; i < \text{num}; i +=) \\
\text{// process element with position } first + i \cdot step \\
\text{where} \\
\text{first} = m(i_1, i_2, \ldots, i_d) \text{ with } i_k = 0, \text{step} = n_1 n_2 \cdots n_{k-1}, \text{num} = n_k
\]

**How to traverse slice:**

\[
\text{for}(\text{ind} = \text{first}; \text{ind} < \text{totnum}; \text{ind} += \text{step}) \\
\text{// process contiguous interval of elements of length runlen starting at position ind} \\
\text{where} \\
\text{first} = n_1 n_2 \cdots n_{k-1} i_k, \text{runlen} = n_1 n_2 \cdots n_{k-1}, \text{step} = n_1 n_2 \cdots n_k, \text{num} = n_1 n_2 \cdots n_{k-1} n_{k+1} \cdots n_d, \text{totnum} = \text{num} \cdot \text{step}
\]

**Traversing all rows in the } k^{th}\text{−direction:**} iterate \(\text{first}\) in the row traversal algorithm over slice with \(i_k = 0\).

**Traversing all rows in all directions:** iterate \(k\) over all dimensions.