Technical Task No. 1

Description

A polyline in 3D is given by the list of nodes' coordinates. Implement an algorithm that searches the nearest point on the polyline to any given point. In case of multiple solutions, output all of them.

Input-output

The algorithm should be framed as a console application:

1. Input (command line options):
   - name of text file containing coordinates of polyline nodes,
   - coordinates of the point to be projected.
2. Output:
   - number of found solutions
   - print the indices of all nearest polyline segments and coordinates of corresponding projection points.

Samples:

Example 1.	**Example 2.**	**Example 3.**
Nodes: 0 0 0 1 0 0 2 1 0 3 1 1 Target point: 2 0.5 0.5 Output: segment 2 point 1.75 0.75 0 segment 3 point 2.25 1 0.25	Nodes: 0 0 0 2 0 0 2 2 0 0 2 0 0 0 0 Target point: 1 1 1 Output: segment 1 point 1 0 0 segment 2 point 2 1 0 segment 3 point 1 2 0 segment 4 point 0 1 0	Nodes: 0 0 0 2 0 0 2 2 0 0 2 0 0 0 0 Target point: 3 3 3 Output: segment 2 point 2 2 0 or segment 3 point 2 2 0

Requirements

1. The algorithm should be implemented in C++.
2. All classes and methods should be precisely documented.
3. The implementation should not involve external libraries like OpenCascade, CGAL, boost, etc.
4. Code accuracy is the main criteria for the successful result.