Exercise 9

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- Source code

Task

Vectors with a large number of zeros are called sparse vectors. They are usually stored in a special form: order vector and the vector of values. Order vector indicates that the vector coordinates take the non-zero value in the following way: the occurrence of "1" in the order vector means that the corresponding position of the vector has a value different from zero, while the occurrence of "0" means that the coordinate has a value zero. The vector of values is a vector of nonzero coordinate values of the vector. Write a program that reads the sparse vectors stored in a standardized form, converts it to the form described above and calculates the value of their scalar product (use vectors in the new form).

Program description

Program is divided into 5 procedures.

1. A standard `main` function which is calling others functions.
2. `read_vector_size` which reads a size of a vectors then allocates required memory.
3. `read_vector` which reads vector dimensions to the memory taking into account redundancy of storing `0` values.
4. `print_vector` which prints given vector from the memory.
5. `dot_product` which evaluates and prints dot product of two given vectors.

Conclusions

- This method of vector storage can be used in order to decrease required memory.
- It's important to prevent redundant multiplications because there are relatively long operations.