Exercise #1	Algorithms and Data Structures	
	Topic: Block diagrams	Version: 1.0 / 2019
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1) Algorithms

1.1) Algorithm - definition

Algorithm – strictly defined procedure, returning expected result in finite number of steps. Formula for performing a specific act.

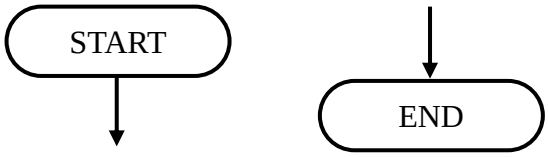
An algorithm has the following features:

- if an input data is supplied, it comes from a well-defined set;
- it gives a result;
- the set of rules (steps) is finite;
- it is precisely defined, every step is clearly described.

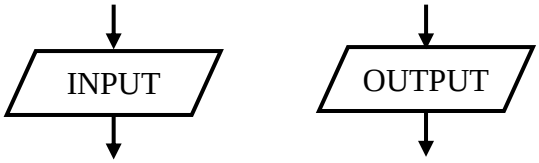
1.2) Block diagrams

Graphical, simple description of an algorithm. A block diagram may represent an algorithm without the need of using any formal programming language. Basic programming blocks:

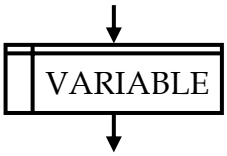
- Start and end of an algorithm:



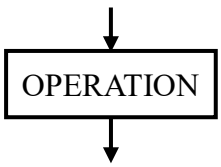
- Input (from user) and output (to user):



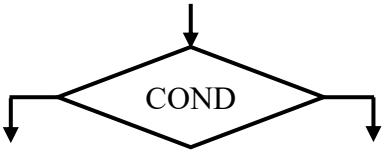
- Definition of a variable:



- Operation (e.g. computation, assignment):



- Condition (if) and loops:



1.3) Example algorithm as a block diagram

Multiplication of “n” integer numbers.

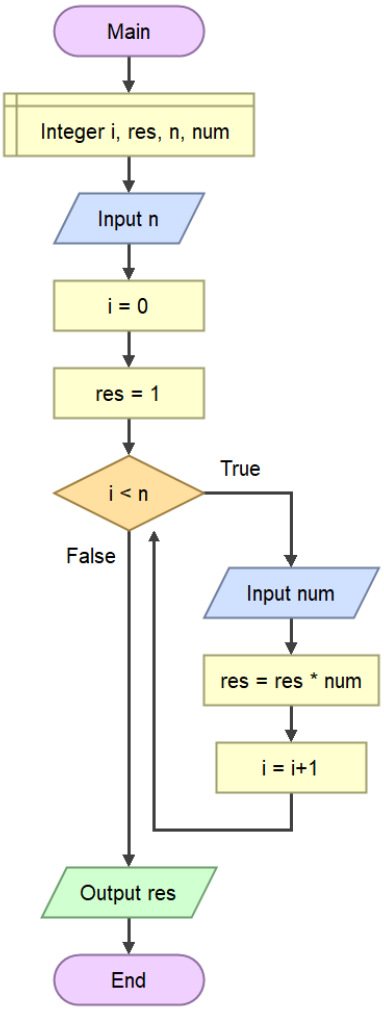
Variables used:

n – the number of values to enter by the user;

i – auxiliary variable, used to count the number of already entered values;

res – result of the multiplication, its initial value is 1 (neutral value for multiplication);

num – currently entered number.



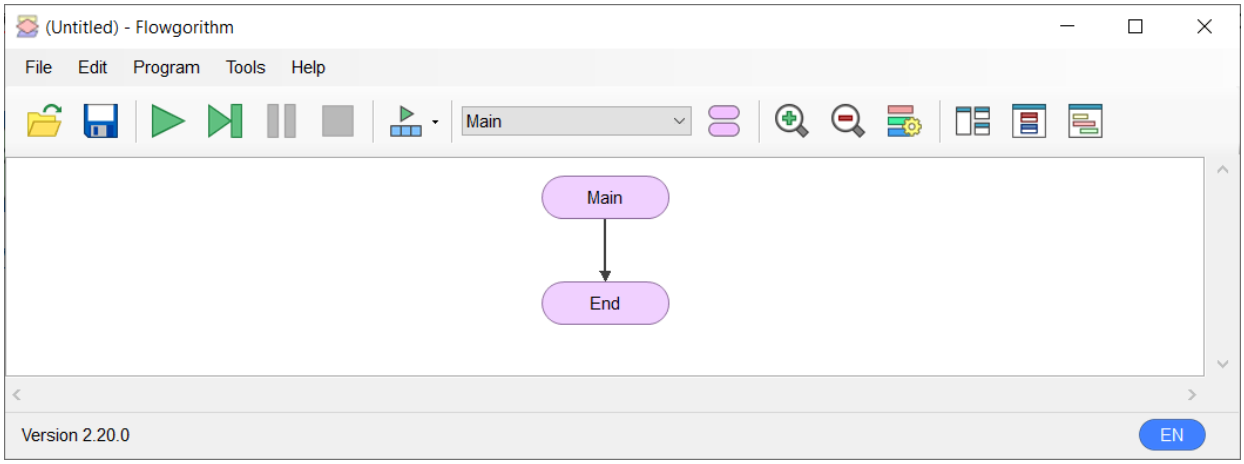
2) Flowgorithm

Flowgorithm is an open-source application for creating, testing and running algorithms entered as block diagrams.

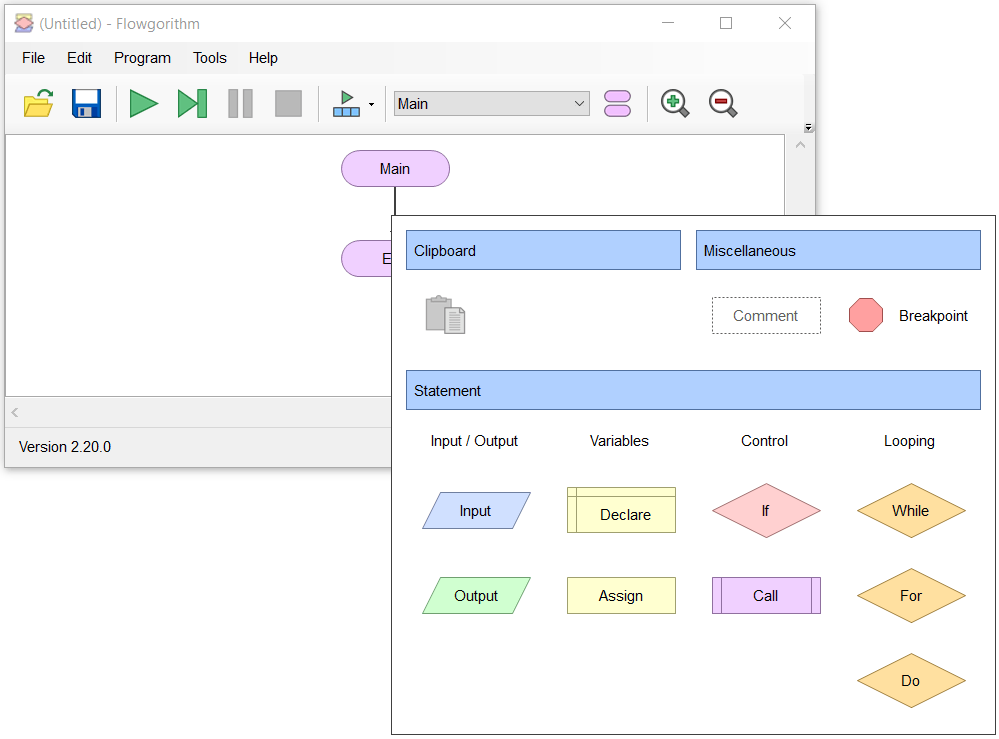
http://www.flowgorithm.org/

2.1) GUI of the Flowgorithm

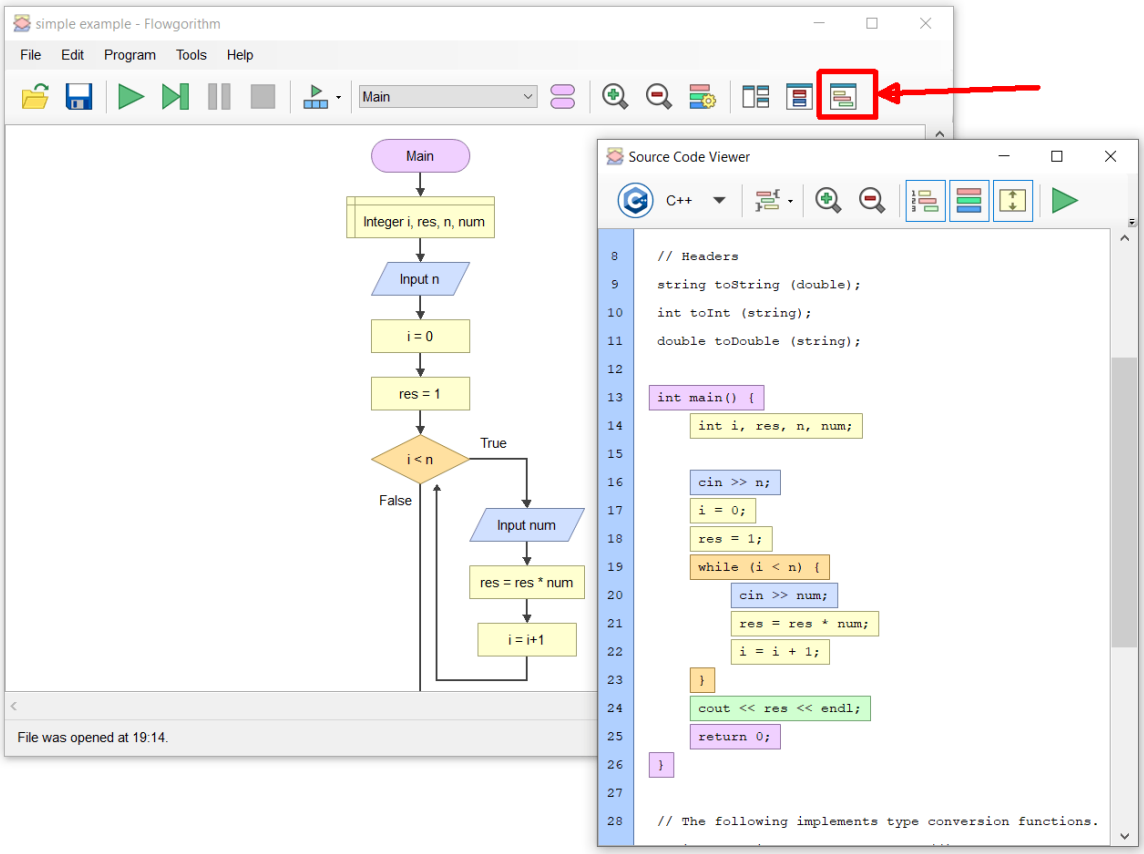
Main window:



Inserting a new block (between “Main” and “End”):



Source code viewer:



2.2) Most important features of the Flowgorithm

Program menu:

Run	Run the program.
Step	Run one step (block) of the program in step-by-step mode.
Pause	Pause the running program.
Stop	Stop the running program.
Run Speed	Sets speeds of the running program (fast, medium and slow).

Tools menu:

Console Window…	Console window for input and output.
Source Code Viewer…	Window with the program shown as a source code in a number of programming languages (C++, Java, Python and more). The code may be copy-pasted into a compiler to build a “real” program.
Variable Watch Window…	Window for viewing current values of variables, especially useful in step-by-step mode.
Layout Windows…	Some predefined layouts with different windows.