Flowchart-based learning / programming

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Flowcharts

Flowcharts show the possible execution paths of the program

Every program has a single input and output (initial edge)

An edge can become a sub-flowchart/component with single IN/OUT

- single-thread execution (but what about fork/join?)

Many executable flowchart editors exists

- Flowgorithm flowgorithm.org
- Algobuild algobuild.com
- Raptor raptor.martincarlisle.com (with OOP!)
- Visual Logic visuallogic.org
- PseInt pseint.SF.net (in Spanish)
- …

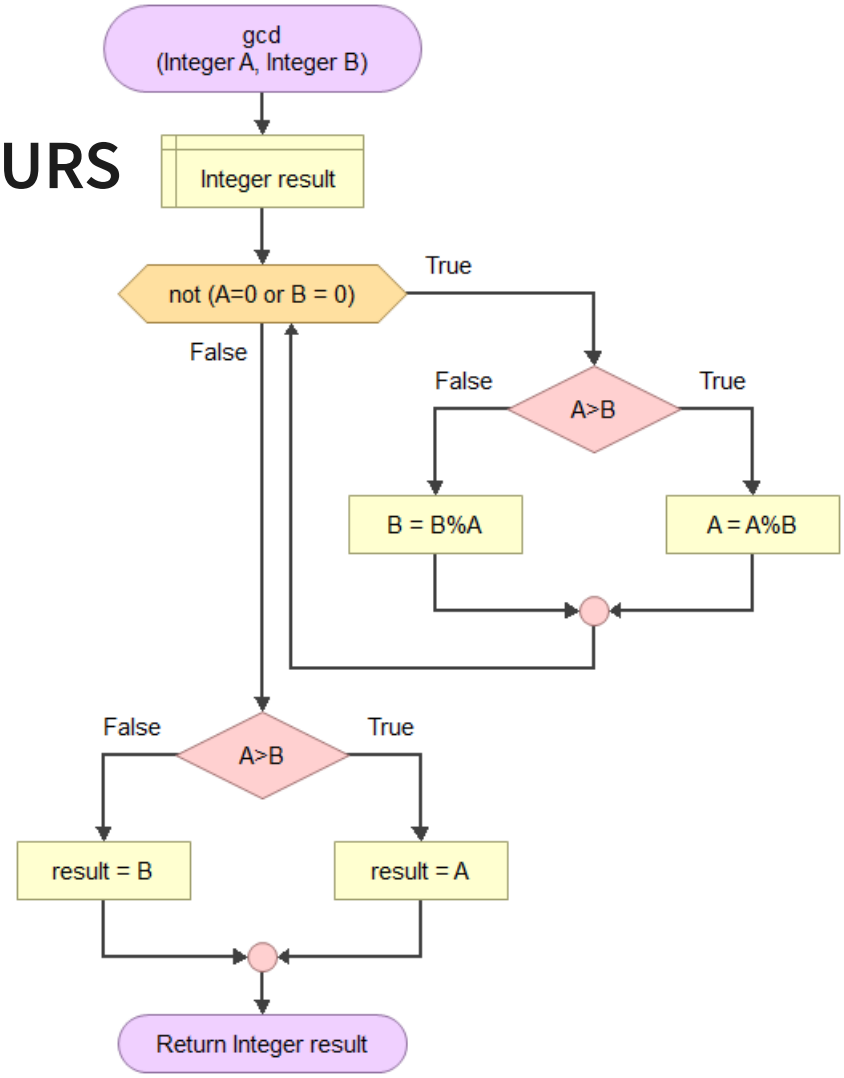
Flowgorithm = Flow-chart + Algorithm

Executable flow-charts

Personalized flow-chart STYLE and COLOURS

Generate your code in many languages
(Spoken or Programmed :-))

MISSING: loading a program source
and generating its flow-chart
(BUT there are tools for that)
- code2flow.com
- …



Code generation by templates

Code generation from flow-charts to many programming languages (custom also)


C#


Perl


TypeScript


C++


PHP


VBA


Fortran 2003


Powershell


Visual Basic .NET


Java


Python


JavaScript


QBasic


Gaddis Pseudocode


Lua


Ruby


IBO Pseudocode


MATLAB


Scala


Auto Pseudocode


Nim


Smalltalk


Pascal


Swift


Open...

Example template: Python

A section with some global info (keywords, ext, case-sensitive ...)

The program is a template with required imports and missing functions (you can extend it if you like)

Types are mapped to corresponding Python types

Each Flowgorithm expression operator or intrinsic function is mapped to the corresponding Python one (with precedence levels)

Functions definition and call templates

Diagram elements map to corresponding templates

DEMO

Simple Data types (and arrays)

T = Integer, Float, String, Boolean

1 dimensional Array of <T>

NO bigintegers (Python)

NO lists or dynamic arrays

NO heterogeneous arrays

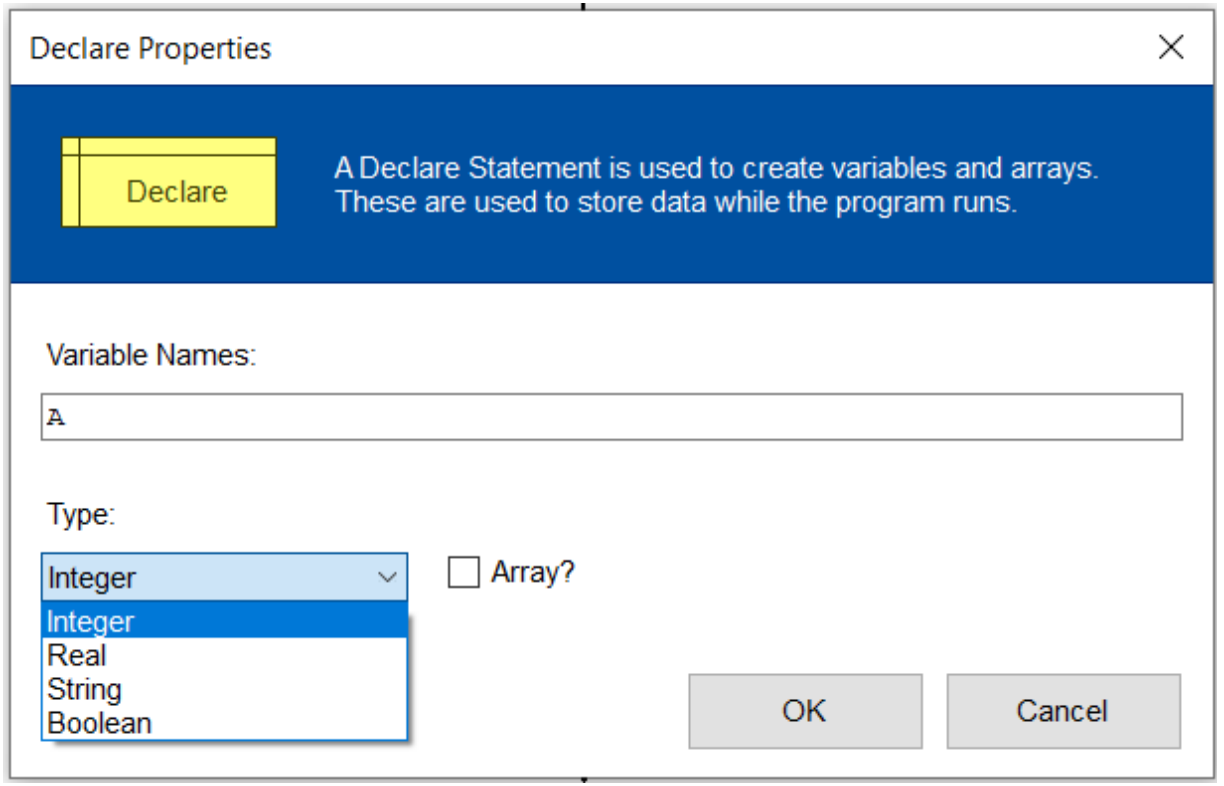
NO multidim. arrays

NO objects

NO coroutines

NO function objects

NO files



Statements

DECLARE variable
ASSIGN variable

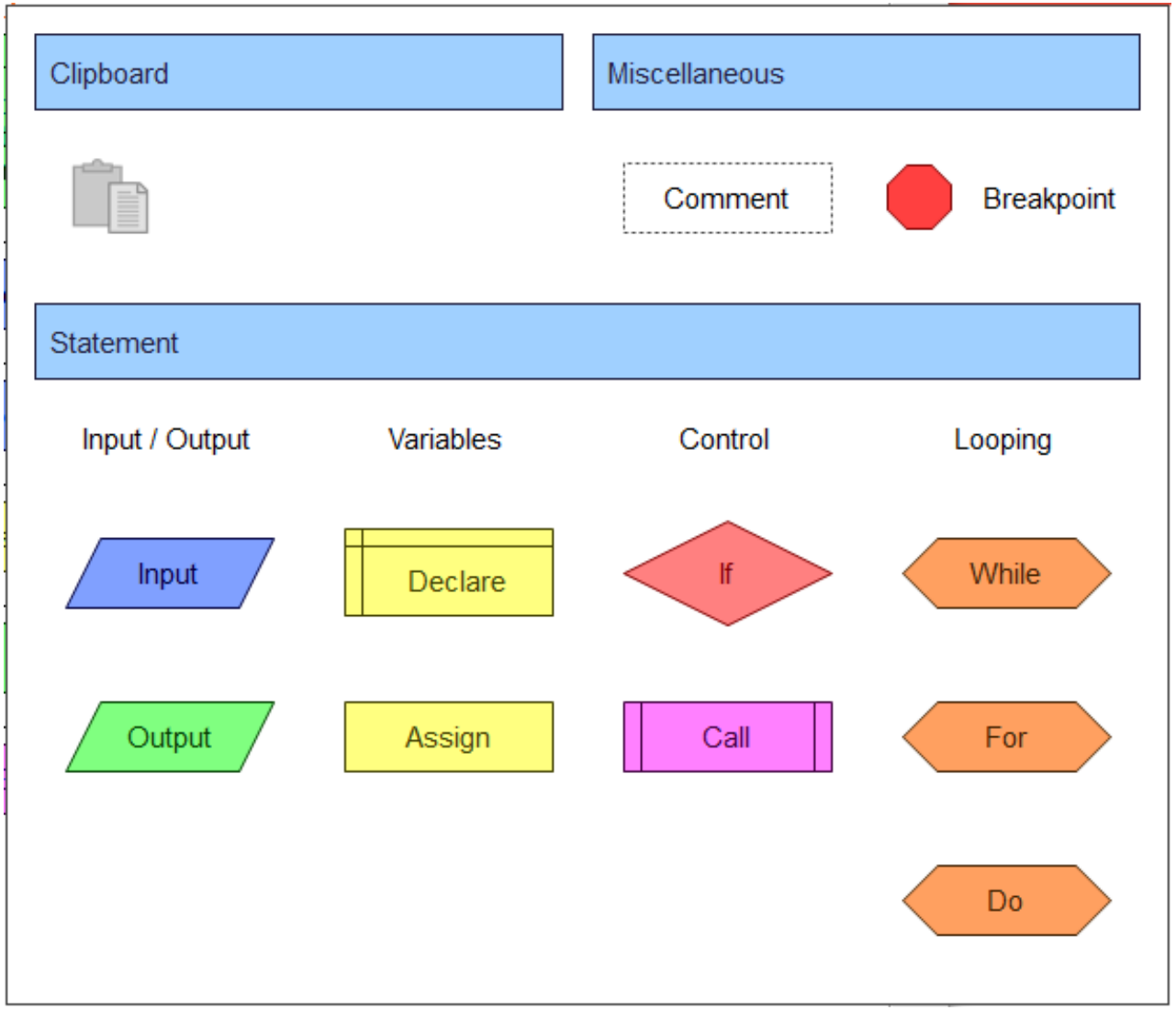
INPUT
OUTPUT

IF

CALL procedure/function

WHILE-do
counted FOR
DO-while
(NO foreach)

COMMENTS



Expressions and operators

Function calls

Logic:	and, or, not, comparison
Math:	+, -, *, /, %, ^, sign trigonometry, log/pow, random, round
String:	concat, len, char(S, i)
Arrays:	size
Conversions:	char, ascii, int, float, str, round

Precedences as usual

Control flow

Functions?	YES	
args by reference?	NO	(except for arrays like C)
multiple return values?	NO	(single simple types only)

ONE entry and ONE exit per function/diagram

NO early return	(use an IF to skip the rest of the code)
NO break	(use an IF to skip the rest of the code)

Multiple assignments?	NO
Concurrency/multi threading?	NO
Events?	NO
Recursion?	YES
Exceptions?	NO

Programming style

PROCEDURAL/SEQUENTIAL?	YES	
FUNCTIONAL?	NO	no functions as arguments
STRUCTURED?	YES	
DECLARATIVE?	NO	
EVENT-BASED?	NO	
CONCURRENT?	NO	
MODULARIZATION?	YES	by function/procedure
ANALYSIS		
TOP-DOWN?	YES	
BOTTOM-UP?	NO	
OBJECT-ORIENTED?	NO	no objects

Debug support

Step-by-step execution (both flow-chart AND generated code)

NOTE: the generated code is NOT executed (only shown)

View Variables content (both simple values and arrays)

Breakpoints

Assertions? (by hand)

Exceptions? NO

IDE support

Refactoring PARTIAL (cut/paste into new functions)

Literate programming / Documentation?

Program properties:

- Title, Author, Description
- BUT: they are NOT present in the generated code!!!

Comments in the flow-chart

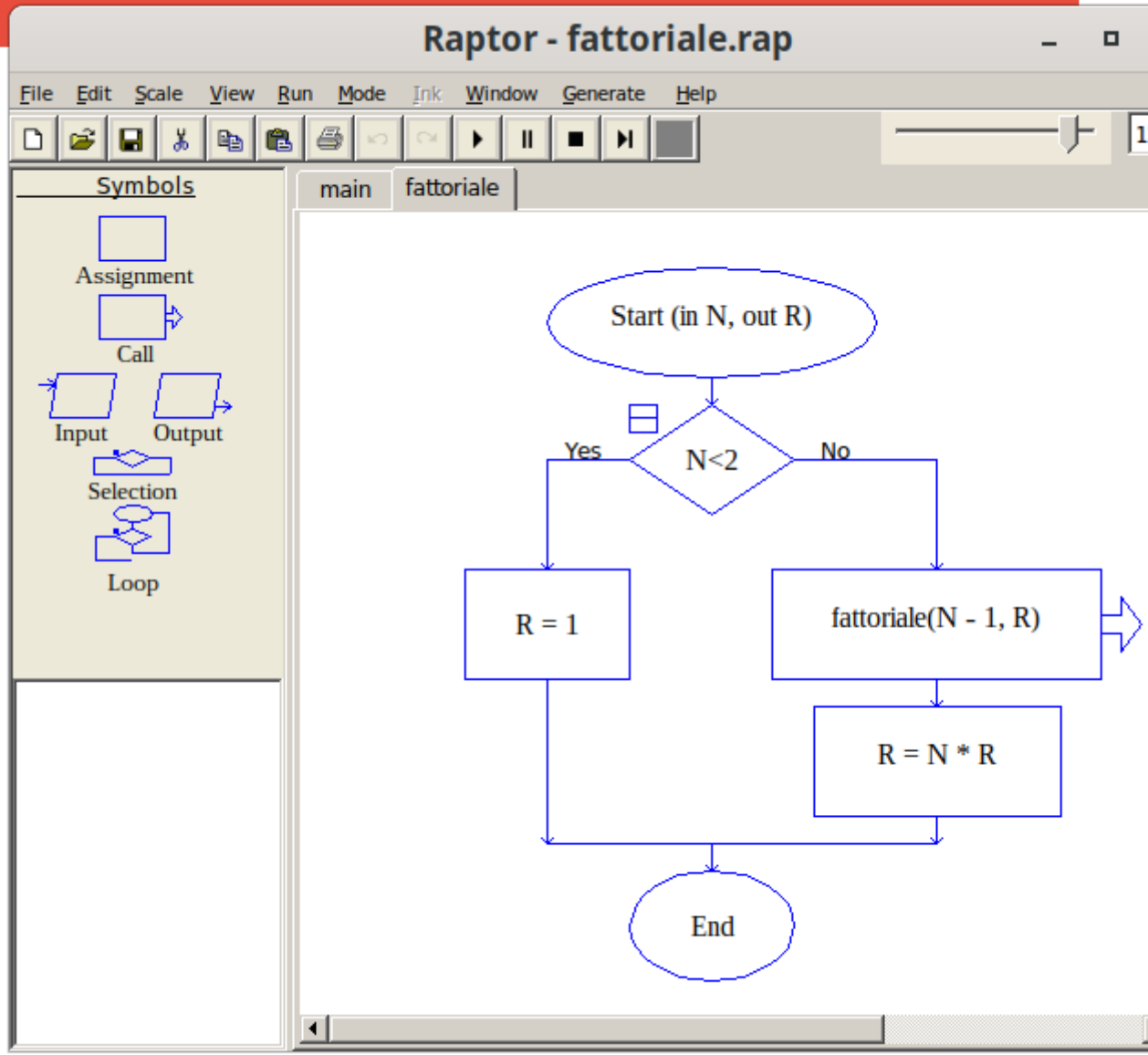
NO free text

Examples

DEMO

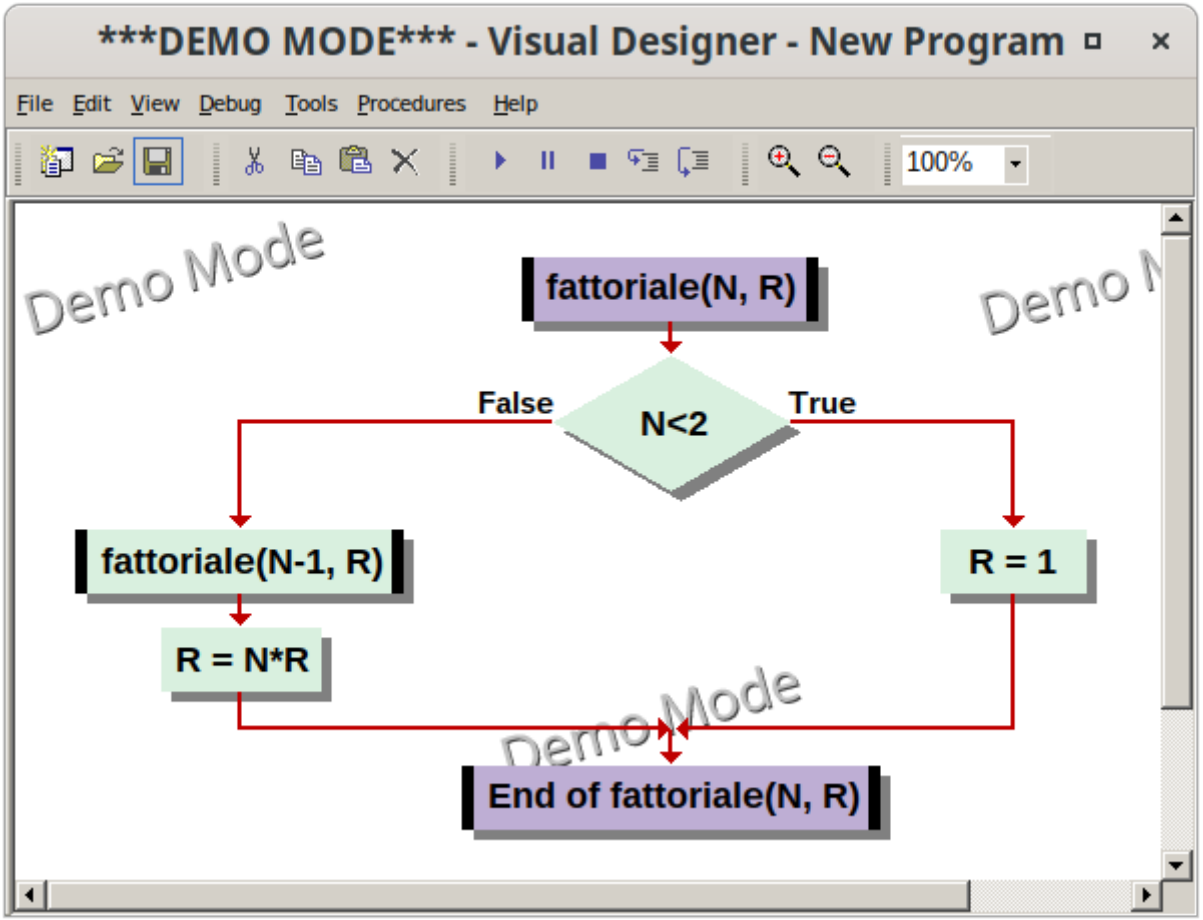
Raptor

Procedures (with IN/OUT args)	YES
Recursion	YES
Functions (procedures + OUT args)	NO?
OOP	YES
Sub-charts	YES
Concurrency	NO
Events	NO
Step-by-step debug	YES
Code generation	YES
Ada, C#, C++, Java, VBA	



Visual Logic

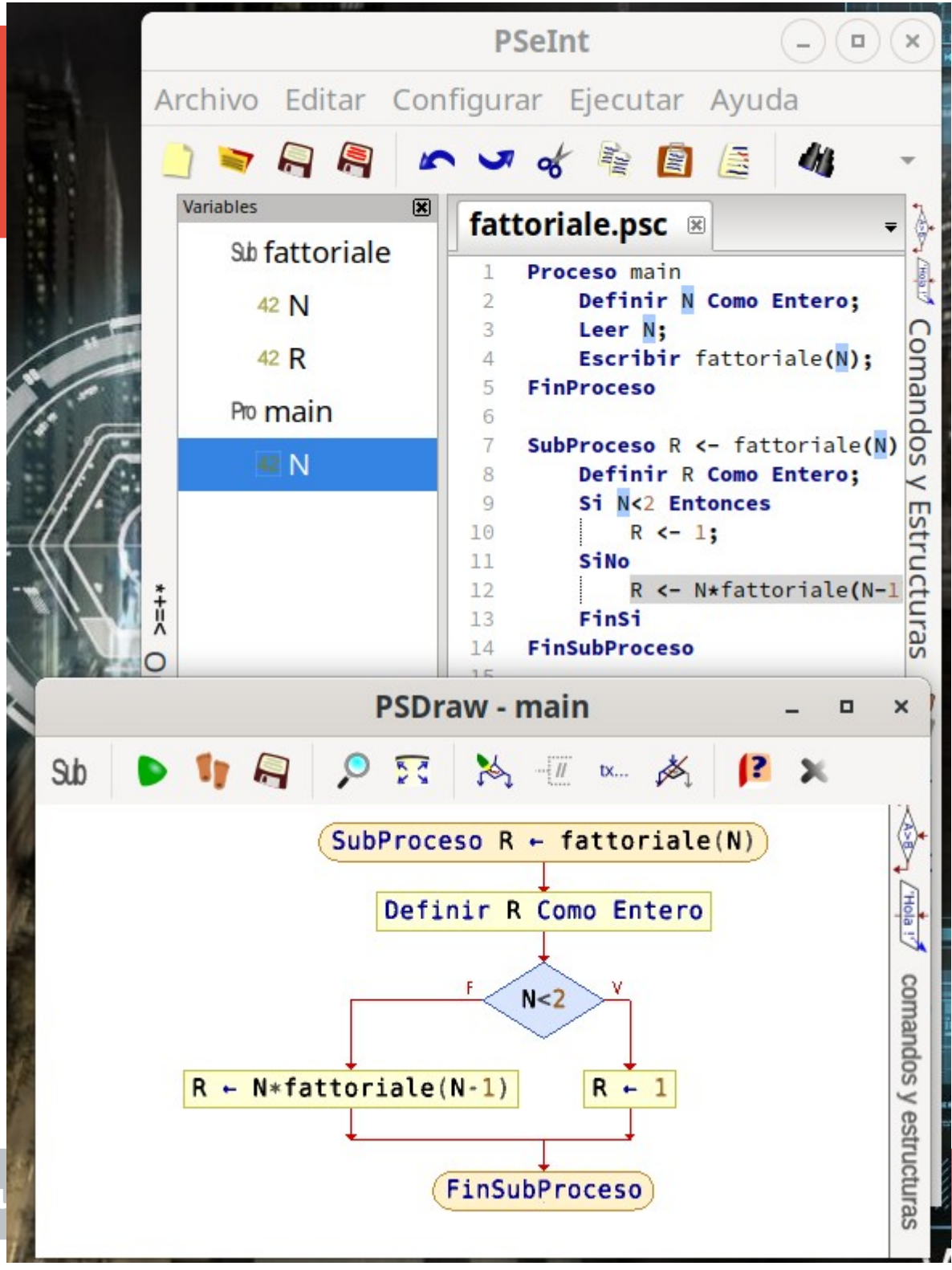
Procedures (with IN/OUT args)	YES
Recursion	YES
Functions	NO?
Functions (procedures + OUT args)	NO
OOP	NO
Sub-charts	NO
Concurrency	NO
Events	NO
Step-by-step debug	YES
Code generation	YES
VB + Pascal	



PseInt (Spanish only)

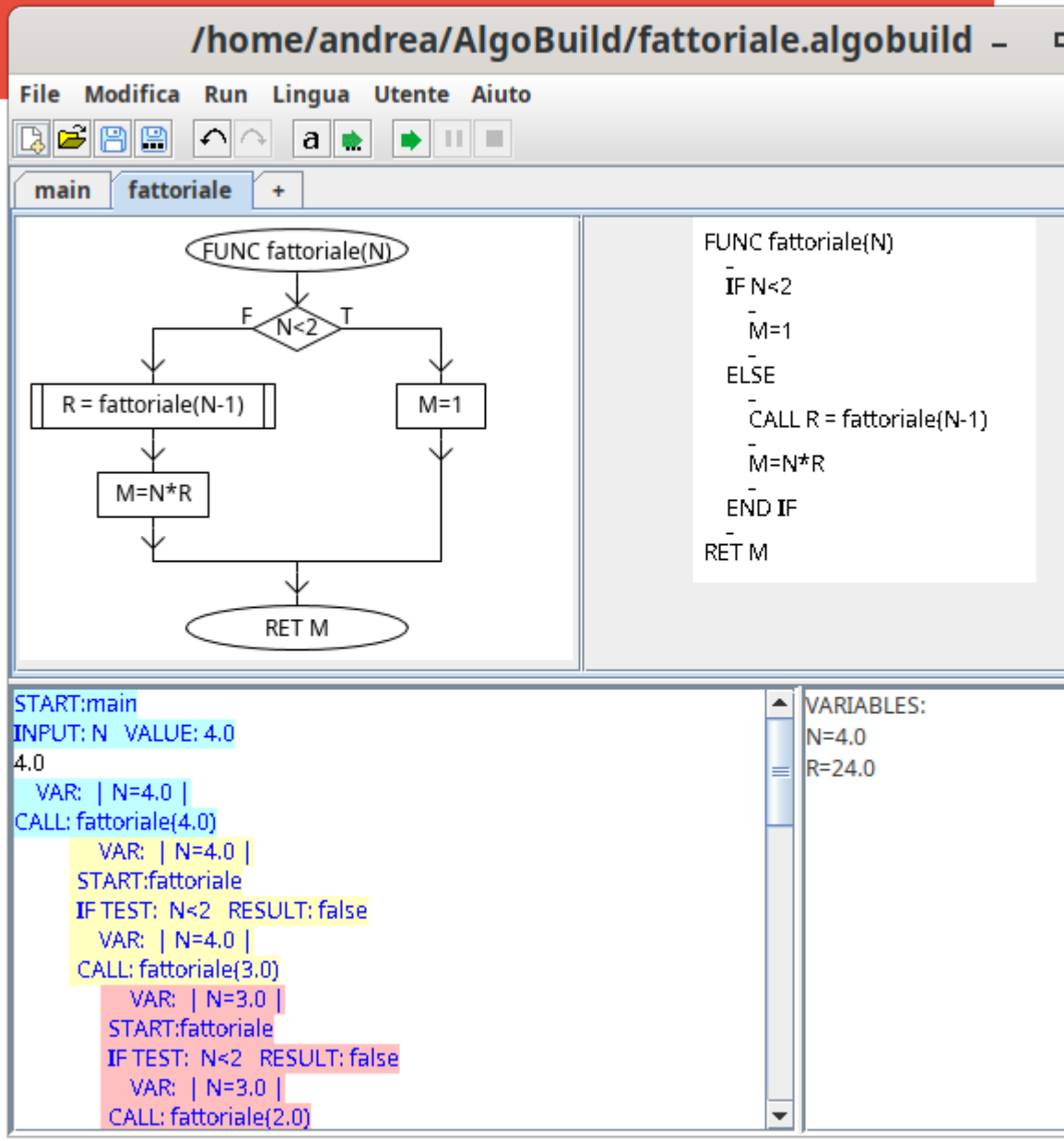
Procedures	YES
Recursion	YES
Functions	YES
OOP	NO
Sub-charts	NO
Concurrency	NO
Events	NO
Step-by-step debug	YES
Code generation	YES

C, C++, C#, Java
JavaScript, MatLab
Pascal, PHP, Python 2/3
Qbasic, Visual Basic



AlgoBuild

Functions	YES
Recursion	YES
Simple data types	
- numbers, strings, 1D arrays	
Complex types	NO
OOP	NO
Concurrency	NO
Events	NO
Step-by-step debug	YES
Code generation	NO



Demo

DEMO