

DAUPS

Documentation

Table of Contents

Chapter 1 : Introduction	3
Chapter 2 : Syntax	5
Chapter 3 : Built in functions	10
Chapter 4 : Errors	14
Chapter 5 : Examples	18
Chapter 6 : Execution	36

Chapter 1 : Introduction

Introduction to the DAUPS Language

DAUPS is an educational programming language designed to promote structured learning of algorithmic thinking. It allows users to write, test, and execute algorithms using a strict, statically-typed syntax aligned with academic standards.

Developed in an academic context, DAUPS is primarily intended for beginner-level computer science students, providing a natural bridge between theoretical algorithms and practical programming.

Language Objectives

DAUPS was designed to:

- Encourage rigorous writing of algorithms,
- Enforce explicit variable declarations with **static typing**,
- Improve error comprehension through clear runtime messages,
- Provide a complete development environment via a **dedicated Visual Studio Code extension**.

Key Features

- **Explicit static typing**: each variable must be declared with a type (`int`, `float`, `string`, etc.) before use.
- **Mandatory declarations**: any undeclared or improperly used variable results in a runtime error.
- **Strict structure**: programs must start with `Algo`, contain a `Begin ... End` block, and may include typed functions.
- **Error detection**: the interpreter verifies type consistency, variable scope, and the validity of function calls.
- **Integrated ecosystem**: execution is handled by a Python-based interpreter, and the VS Code extension provides an interactive environment with syntax highlighting, autocompletion, tooltips, and direct execution.

Running a DAUPS Program

To run DAUPS code:

1. Install the official extension from the Visual Studio Code marketplace:
<https://vscode.com/extension>.
2. Create a new file with the `.daups` extension.
3. Write your algorithm following the language's syntax.
4. Click the ▶ button in the top bar to launch the interpreter.

The environment automatically reports syntax, type, or runtime errors and offers contextual suggestions through autocompletion and tooltips.

Additional Resources

- **DAUPS Interpreter:** a Python-based execution engine.
- **VS Code Extension:** enhances code readability and interaction.
- **Online Documentation:** regularly updated and available in multiple languages.

If you have a question, suggestion, or notice an issue in this documentation, you may open an issue here: <https://github.com/yourusername/daups-extension/issues>

Chapter 2 : Syntax

DAUPS Language Syntax

The DAUPS language is a pseudocode language with a rigid structure. It is designed to be easily readable and close to natural language, while enforcing a strict structure to guarantee correct execution.

General Structure

A program begins with the keyword `Algo`, optionally followed by variable declarations. The main block is delimited by the keywords `Begin` and `End`.

```
Algo
  Variable_declarations
Begin
  Instructions
End
```

Comments

Comments start with `#` and extend to the end of the line.

```
# This is a comment
get x # This is also a comment
```

Basic Types

The following data types are supported:

- `int`: integer
- `float`: real number
- `bool`: boolean
- `string`: string of characters
- `array of T`: array of type `T`, where `T` is one of the aforementioned types (including another array)

```
x : int
text : string
list : array of int
matrix : array of array of float
```

Variable Declaration

Variables must be declared **before the Begin block, within the Algo block**. Multiple variables of the same type can be declared together, separated by commas.

```
Algo
  identifier_1 : type_1
  identifier_2_1, identifier_2_2 : type_2
Begin
  Instructions
End
```

Assignment

The assignment operator is <--.

```
Algo
  identifier_1 : type_1
  identifier_2_1, identifier_2_2 : type_2
Begin
  identifier_1 <-- value
  identifier_2_1 <-- expression
End
```

Input / Output

Reading (get)

```
get identifier
get array[index]
```

Printing (print)

```
print "Identifier value:", identifier, "Saut-de-ligne"
```

"Saut-de-ligne" is a special string representing a line break.

Control Flow

Conditional (if, else if, else)

```
if Condition then
    Instructions
else if Condition then
    Instructions
else
    Instructions
```

Example:

```
if x > 0 then
    print "Positive"
if x == 0 then
    print "Zero"
else
    print "Negative"
```

Loops

While Loop (while)

```
while (Condition)
    Instructions
```

For Loop (for)

```
for i <-- 0 to 10
    print i
```

```
for i <-- 10 downto 0
    print i
```

Functions

A function is defined by the keyword `function`, followed by its name, typed parameters, return type (if any), and a `Begin/End` block.

```
function name(param_1 : type_1, ...) : return_type
  var : type
  Begin
    Instructions
    return value
  End
```

Example:

```
function maximum(a : int, b : int) : int
  Begin
    if a > b then
      return a
    else
      return b
  End
```

Arrays

Declaration

```
t : array of int
mat : array of array of int
```

Creation

```
t <-- create_array(5)
mat <-- create_array(3, 4)
```

Access

```
t[0] <-- 42
get mat[i][j]
```


Operations Permitted by Type

Type	Permitted Operations
int	+, -, *, /, div, mod, ==, <, >...
float	+, -, *, /, ==, <, >...
bool	and, or, not, comparisons
string	+ (concatenation), comparisons (==, !=, etc.)
array	index access t[i], size size(t), creation

Important Notes

- Case is **sensitive** (Variable, variable, VARIABLE are distinct).
- Indentation is **mandatory**.
- The keyword `End` closes all blocks (main program and functions).
- Functions may call one another or be used within the main block.
- An error is raised if a variable is used without prior declaration.

Chapter 3 : Built in functions

Built-in Functions of the DAUPS Language

The **DAUPS** language provides several **built-in** functions, accessible directly without redefinition. They are automatically loaded into the global symbol table at each execution.

List of Built-in Functions

Name	Description	Number of Arguments	Example Call
print	Displays one or more items without automatically adding a newline	0 or more (unlimited)	print "Hello", x
get	Reads a user input and assigns it to a variable	1 (mandatory)	get x OR get tab[i][j]
create_array	Creates an empty array of a given size	≥1 (unlimited)	tab <-- create_array(3, 4)
run	Executes another .dps (or .txt) file	1 (string path)	run "example.dps"
SQRT	Computes the square root of a number	1 (numeric)	print SQRT(25)
nombreAleatoire	Generates a random integer between two bounds	2 (numeric)	nombreAleatoire(1, 100)
size	Returns the size of an array or a specific dimension	1 or 2 (array, [dim])	size(tab) OR size(tab, 1)
Pi	Mathematical constant (π)	0 (none)	print Pi

Details of Functions

◆ print ...

Displays values without automatically appending a newline.

- **Arguments:** 0 or more (string, int, float, etc.)

"Saut-de-ligne" is a special string representing a newline.

- **Example:**

```
print "Bonjour", nom, 42
```

◆ get x, get tab[i]

Prompts the user for input, dynamically typed according to the targeted variable.

- **Arguments:** 1 (target variable)
- **Example:**

```
get age  
get matrice[i][j]
```

◆ create_array(dim1, dim2, ...)

Creates an empty array with one or more dimensions.

- **Arguments:** ≥ 1 (each argument represents a dimension, of type int)
- **Examples:**

```
tab <- create_array(5)           # 1D array  
mat <- create_array(4, 3)        # 2D array  
cube <- create_array(2, 2, 2)    # 3D array
```

◆ run "path"

Executes an external DAUPS file.

- **Arguments:** 1 (string – path to a .dps or .txt file)
- **Example:**

```
run "my_file.dps"
```

◆ Sqrt(value)

Returns the square root of a number.

- **Arguments:** 1 (int or float)
- **Example:**

```
r <-- Sqrt(16)
```

◆ nombreAleatoire(min, max)

Returns a random integer in the interval [min, max].

- **Arguments:** 2 (int or float)
- **Example:**

```
n <-- nombreAleatoire(1, 10)
```

◆ size(array[, dimension])

Returns the total size of an array or the size of a specific dimension.

- **Arguments:** 1 (array) or 2 (array, dimension)
- **Examples:**

```
print size(tab)           # total size  
print size(tab, 1)        # size of the 1st dimension
```

◆ Pi

Floating-point constant equivalent to $\pi \approx 3.141592653589793$.

- **Arguments:** 0
- **Example:**

```
print Pi
```

Chapter 4 : Errors

Error Handling in the DAUPS Language

The DAUPS interpreter is designed to detect and report common runtime errors. Through static and dynamic analysis, it provides explicit messages that facilitate debugging and understanding of code behavior.

Types of Detected Errors

Error Type	Description
Undeclared Variable	Use of a variable not present in declarations
Uninitialized Variable	Reading a variable before assignment
Type Mismatch	Assignment or operation incompatible with the expected type
Unknown Function Call	Invocation of a function that is undefined or misspelled
Incorrect Number of Arguments	Function call with too many or too few parameters
Out-of-Bounds Array Access	Attempt to access an index that does not exist
Unsupported Type	Use of a non-existent or malformed type
Invalid Expression	Incorrect syntax in an assignment or a conditional test
User Input Error	Input of a value that does not conform to the variable's type
Invalid Instruction	Unrecognized keyword or structure

Examples of Errors and Corresponding Messages

Undeclared Variable

```
Algo
Begin
  x <-- 5  # x has not been declared
End
```

RunTime error: Variable 'x' is not declared

```
x <-- 5  # x has not been declared
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

Type Mismatch

```
Algo
  x : int
Begin
  x <-- "text"
End
```

RunTime error: Variable 'x' is of type 'int', but got 'String'

```
x <-- "text"
^^^^^^
```

Unknown Function Call

```
Algo
  result : int
Begin
  result <-- unknown(3)
End
```

RunTime error: 'unknown' is not defined

```
result <-- unknown(3)
^^^^^^^^^^^^
```

Incorrect Number of Arguments

```
function f(a : int, b : int) : int
  Begin
    return a + b
  End

Algo
Begin
  print f(3)  # one argument is missing
End
```

RunTime error: 1 too few arguments passed into 'f'
Expected 2 arguments, got 1

```
print f(3)  # one argument is missing
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

Out-of-Bounds Array Access

```
Algo
  tab : array of int
Begin
  tab <-- create_array(3)
  print tab[5]  # out of bounds
End
```

RunTime error: Index access error (probably out of bounds)

```
print tab[5]  # out of bounds
^^^^^^^^^^^^
```

Error Triggering

Errors are triggered either:

- **During static analysis** (declarations, types)
- **At runtime** (memory access, dynamic calls, user input)

The interpreter halts execution as soon as an error is detected, indicating precisely **the line concerned**, **the type of error**, and **the variable or function involved**.

Best Practices to Avoid Errors

- Always declare variables with their type before ~Begin~.
- Respect types in assignments and function calls.
- Verify array dimensions before any index access.
- Read error messages carefully; they are designed to be explicit.

Chapter 5 : Examples

Examples DAUPS

Example 1

```
Algo
  x : int
Begin
  print "Donner une valeur entiere"
  get x
  x <-- x+1
  print x
End
```

Example 2

```
Algo
  x, y : float
Begin
  print "donnez une valeur entiere"
  get x
  y <-- 3*x+1
  print y
End
```

Example 3

```
Algo
  x, y, temp : float
Begin
  print "Donner des valeurs numeriques"
  get x
  get y
  temp <-- x
  x <-- y
  y <-- temp
End
```

Example 4

```
Algo
  a, b, c, D, x1, x2 : float
Begin
  print "Quel est le parametre a ?"
  get a
  print "Quel est le parametre b ?"
  get b
  print "Quel est le parametre c ?"
  get c
  D <-- (b*b - 4*a*c)
  if (D < 0) then
    print "Delta est negatif et l'equation n'admet aucune racine reelle"
  else if D == 0 then
    print "Delta = 0 et l'equation admet une solution double x = ", -b/(2*a)
  else
    x1 <-- (-b - SQRT(D)) / (2*a)
    x2 <-- (-b + SQRT(D)) / (2*a)
    print "Delta positif, l'equation admet 2 solutions reelles et distinctes",
End
```

Example 5

```
Algo
  a, b, c : int
Begin
  print "Saisir un entier"
  get a
  print "Saisir un entier"
  get b
  print "Saisir un entier"
  get c
  if (a==(b+c) or b==(a+c) or c==(a+b)) then
    print "oui"
  else
    print "non"
End
```

Example 6

Algo

a, b, c, d, e, f, x, y : int

Begin

get a

get b

get c

get d

get e

get f

if ((d*b)-(e*a))==0 then

Les droites ont la même pente

Les coeff directeurs sont égaux

$a/b == d/e \Leftrightarrow ae = db$

if b==0 and e==0 then

cas de 2 droites verticales

if (c*d)==(f*a) then

2 droites verticales confondues

print "Infinite de solutions"

else

les 2 droites verticales sont parallèles

print "pas de solution"

else

if ((b*f)-(e*c))==0 then

droite confondues

print "Infinite de solutions"

else

les droites sont parallèles

print "Pas de solutions"

else

$((db-ea) \neq 0)$

x <- ((b*f)-(e*c))/((d*b)-(e*a))

if b == 0 then

$e \neq 0$

y <- (f/e)-(d/e)*x

else

y <- (c/b)-(a/b)*x

print "x=", x

print "y=", y

End

Example 7

```
Algo
  n : float
Begin
  print "Saisir un entier"
  get n
  if (n<10) then
    print "Ajourné"
  else
    if n < 12 then
      print "Passable"
    else
      if n<14 then
        print "AB"
      else
        if n<16 then
          print "B"
        else
          print "TB"
End
```

Example 8

```
Algo
#calcule  $x^n$ 
  x : float
  n : int
  i : int #compteur
  r : float #variable stockant le résultat
Begin
  print "Quelle est la valeur de x ?"
  get x
  while (x<0)
    print "x ne peut pas être négatif, entrez une autre valeur !"
    get x
  print "Quelle est la valeur de n ?"
  get n
  while (n<0)
    print "n ne peut pas être négatif, entrez une autre valeur!"
    get n
  i <-- 0
  r <-- 1
  while (i<n)
    r <-- r*x
    i <-- i+1
  print r
End
```

Example 9

```
Algo
# somme des impaires < 100
  cpt, r : int
Begin
  cpt <-- 1
  r <-- 0
  while (cpt<= 100)
    if (cpt mod 2) != 0 then
      r <-- r + cpt
    cpt <-- cpt+1
  print r
End
```

Example 10

```
Algo
# Est-ce un nombre premier ?
n, d, somme : int
Begin
  get n
  d <-- 1
  somme <-- 0
  while (d < n)
    if (n mod d) == 0 then
      somme <-- somme + d
    d <-- d+1
  print "La somme des diviseurs est :"
  print somme
  if somme == 1 then
    print "Ce nombre est premier."
End
```

Example 11

```
Algo
# Tous les nombres parfaits  $\leq n$ 
n, d, somme : int
Begin
  get n
  while (n > 1)
    # Chercher les diviseurs de ce nombre n
    d <-- 1
    somme <-- 0
    while (d < n)
      if ((n mod d) == 0) then
        # d est un diviseur de n
        somme <-- somme + d
      d <-- d + 1
    if (somme == n) then
      # n est un nombre parfait
      print n
    n <-- n - 1
End
```

Example 12

```
Algo
# Tous les multiples de 7 entre i et j
  i, j : int
Begin
  print "Debut : "
  get i
  print "Fin : "
  get j
  while (i<j)
    if ((i mod 7) == 0) then
      print i
      print " est un multiple de 7."
      print "Saut-de-ligne"
    i <-- i+1
End
```

Example 13

```
Algo
# Affichage du tableau
  nbLignes : int # numéro de la ligne courante
  i : int # entier à afficher
  nbCol : int # numéro de la colonne courante
Begin
  nbLignes <-- 1
  while (nbLignes <= 4)
    nbCol <-- 1
    i <-- 1
    while (nbCol <= 5)
      print i
      print " "
      i <-- i + nbLignes
      nbCol <-- nbCol + 1
    print "Saut-de-ligne"
    nbLignes <-- nbLignes + 1
End
```


Example 14

```
Algo
# Suite croissante ?
n : int
i : int # compteur
p : int # nombre précédemment saisi
c : int # nombre courant saisi
b : bool # vrai tant que la suite est triée
Begin
  n <-- 0
  while (n <= 0)
    get n
  get c
  i <-- 1 # On a déjà saisi un entier - reste (n-1)
  b <-- True
  while (i < n)
    p <-- c # on stocke l'entier précédemment saisi
    get c
    if (p > c) then
      # si l'entier est < au précédent
      b <-- False # Valeurs non-ordonnées de manière croissante.
    i <-- i + 1
  if (b == True) then
    print "Les", n, "valeurs sont triées de façon croissante."
  else
    print "Les", n, "valeurs ne sont pas triées."
End
```

Example 15

Algo

Somme des pairs == Somme des impairs ?

n : int

si : int *# sommes des entiers impairs*

sp : int *# sommes des entiers pairs*

i : int *# compteur*

e : int *# entier saisi*

Begin

n <-- 0

si <-- 0

sp <-- 0

while (n <= 0)

 print "Saisir une valeur positive non nulle :"

 get n

i <-- 0

while (i < n)

 e <-- 0

 while (e <= 0)

 print "Saisir un entier positif non nul :"

 get e

 if (e mod 2 == 0) then

 sp <-- sp + e

 else

 si <-- si + e

 i <-- i + 1

if (si == sp) then

 print "La somme des nombres pairs est égale à la somme des nombres impairs."

else

 print "La somme des nombres pairs n'est pas égale à la somme des nombres impairs."

End

Example 16

```
function maximum(n1 : float, n2 : float) : float
  Begin
    if (n1 > n2) then
      return n1
    else
      return n2
    End
  End

Algo
  n1, n2 : float
  Begin
    print "Saisir deux valeurs"
    get n1
    get n2
    print maximum(n1, n2)
  End
```

Example 17

```
function cube(x : float) : float
  Begin
    return x ** 3
  End

function volume(r : float) : float
  Begin
    return (4 / 3) * Pi * cube(r)
  End

Algo
  r : float
  Begin
    print "Saisir le rayon"
    get r
    print volume(r)
  End
```

Example 18

```
function tableMulti(base : int, debut : int, fin : int)
  n : float
  Begin
    print "Fragment de la table de multiplication par", base, ": "
    n <-- debut
    while (n <= fin)
      print n, "x", base, "=", n * base
      print "Saut-de-ligne"
      n <-- n + 1
    End
  End

Algo
  b, d, f : int
  Begin
    print "Saisir la base, le début et la fin"
    get b
    get d
    get f
    tableMulti(b, d, f)
  End
```

Example 19

```
function pgcdParDiviseurs(a : int, b : int) : int
  pgcd : int
  Begin
    pgcd <-- b
    while (pgcd > 1)
      if (a mod pgcd == 0 and b mod pgcd == 0) then
        return pgcd
      pgcd <-- pgcd - 1
    return 1
  End

function maximum(a : int, b : int) : int
  Begin
    if (a > b) then
      return a
    else
      return b
  End

function minimum(a : int, b : int) : int
  Begin
    if (a < b) then
      return a
    else
      return b
  End

function pgcdParDifferences(a : int, b : int) : int
  diff : int
  Begin
    diff <-- a - b
    while (diff > 0)
      a <-- maximum(diff, b)
      b <-- minimum(diff, b)
      diff <-- a - b
    return a
  End

function pgcdParEuclide(a : int, b : int) : int
  reste : int
  Begin
    reste <-- a mod b
    while (reste > 0)
      a <-- b
      b <-- reste
      reste <-- a mod b
    return b
```

```
End

Algo
  a, b : int
Begin
  get a
  get b
  print pgcdParDiviseurs(a, b), "Saut-de-ligne"
  print pgcdParDifferences(a, b), "Saut-de-ligne"
  print pgcdParEuclide(a, b)
End
```

Example 20

Algo

```
taille, i, dessus, indice : int
somme, moyenne, grand : float
note : array of float
```

Begin

```
get taille
note <-- create_array(taille)
somme <-- 0

for i <-- 0 to taille - 1
    print "Note en position ", i+1, " ?"
    get note[i]
    somme <-- somme + note[i]

moyenne <-- somme / taille
print "la moyenne est", moyenne, "Saut-de-ligne"

dessus <-- 0
for i <-- 0 to taille - 1
    if note[i] >= moyenne then
        dessus <-- dessus + 1
print "le nombre de notes au-dessus de la moyenne est", dessus, "Saut-de-ligne"

grand <-- note[0]
indice <-- 0
for i <-- 1 to taille - 1
    if note[i] > grand then
        grand <-- note[i]
        indice <-- i

print "le nombre maximum est", grand, "Saut-de-ligne"
print "il est en position", indice + 1, "Saut-de-ligne"
```

End

Example 21

```
Algo
  i, long : int
  tab : array of int
Begin
  get long
  tab <-- create_array(long)

  for i <-- 0 to long - 1
    get tab[i]
    if tab[i] >= 0 then
      print tab[i], "Saut-de-ligne"
End
```

Example 22

```
Algo
  i, long, long2 : int
  tab, tab2 : array of int
Begin
  get long
  tab <-- create_array(long)
  tab2 <-- create_array(long)
  long2 <-- 0

  for i <-- 0 to long - 1
    print "Élément en position ", i + 1, " ?", "Saut-de-ligne"
    get tab[i]
    if tab[i] >= 0 then
      tab2[long2] <-- tab[i]
      long2 <-- long2 + 1

  print "le nouveau tableau contient ", long2, " éléments positifs", "Saut-de-ligne"
  tab <-- tab2

  for i <-- 0 to long2 - 1
    print tab[i], "Saut-de-ligne"
End
```


Example 23

Algo

```
i, j, long : int  
tab : array of int
```

Begin

```
get long  
tab <-- create_array(long)  
for i <-- 0 to long - 1  
    print "Élément en position ", i + 1, " ?"  
    get tab[i]
```

```
j <-- 0  
for i <-- 0 to long - 1  
    if tab[i] >= 0 then  
        tab[j] <-- tab[i]  
        j <-- j + 1
```

```
long <-- j  
for i <-- 0 to long - 1  
    print tab[i], "Saut-de-ligne"
```

End

Example 24

```
function tabAlea(n : int, a : int, b : int) : array of int
  T : array of int
  i : int
Begin
  T <-- create_array(n)
  for i <-- 0 to n - 1
    T[i] <-- nombreAleatoire(a, b)
  return T
End

function tabProduit(T : array of int) : int
  produit, i : int
Begin
  produit <-- 1
  for i <-- 0 to size(T) - 1
    produit <-- produit * T[i]
  return produit
End

Algo
  a, b, n, i, produit : int
  T : array of int
Begin
  print "Saisir les trois valeurs", "Saut-de-ligne"
  get n
  get a
  get b
  T <-- tabAlea(n, a, b)
  produit <-- tabProduit(T)
  for i <-- 0 to n - 1
    print T[i], "Saut-de-ligne"
  print produit, "Saut-de-ligne"
End
```

Example 25

```
Algo
  i, j : int
  tab : array of int
Begin
  tab <-- create_array(4, 2)
  for i <-- 0 to 3
    for j <-- 0 to 1
      tab[i][j] <-- 2 * i + j
  for i <-- 0 to 3
    for j <-- 0 to 1
      print tab[i][j], "Saut-de-ligne"
End
```

Example 26

```
Algo
  i, j, grand : int
  tab : array of int
Begin
  tab <-- create_array(12, 8)
  for i <-- 0 to 11
    for j <-- 0 to 7
      print "Quel est l'élément de la ligne ", i + 1, " et de la colonne ", j + 1, " : ",
      get tab[i][j]

  grand <-- tab[0][0]
  for i <-- 0 to 11
    for j <-- 0 to 7
      if tab[i][j] > grand then
        grand <-- tab[i][j]
  print "le nombre maximum est ", grand, "Saut-de-ligne"
End
```

Chapter 6 : Execution

Execution Flow in the DAUPS Language

The DAUPS interpreter executes a program following a rigid, statically-typed structure in which blocks, variables, functions, and instructions are validated both statically and dynamically.

This chapter describes the complete execution pipeline, from loading a .daups file to producing the results.

Main Execution Steps

1. Loading the source file
2. Lexical Analysis / Tokenization
3. Syntax Analysis
4. Semantic Analysis (types, functions, scopes...)
5. Symbol Table Construction
6. Line-by-Line Execution
7. Error Handling and Result Display

1. Loading the Source File

DAUPS source files are typically .daups or .txt files containing a structure such as:

```
Algo
  a, b : int
Begin
  get a
  get b
  print a + b
End
```

The file is read in its entirety, and then each line is processed sequentially.

2. Syntax Analysis and Block Construction

The interpreter identifies the main blocks (Algo, Begin, End) and builds a logical representation of the program, including:

- Simple instructions (get, print, `x <-- 3`)
- Control blocks (if, while, for)
- Function definitions
- Variable declarations

3. Symbol Table

Declared variables and defined functions are recorded in a symbol table:

- Globally for the entire program
- Locally for each function's scope

Each symbol is associated with:

- a name
- a type (int, float, etc.)
- a value (initial or determined at runtime)
- a context (local or global)

4. Instruction Execution

The main block is executed in order of appearance. Each line may correspond to one of the following:

- an assignment
- a user input instruction
- a control structure
- a function call (built-in or user-defined)

Expressions are evaluated dynamically with type checking.

5. Function Calls

When a function is called:

- Arguments are evaluated
- A local context is created
- Local variables are isolated from the global environment
- A value is returned if the function specifies one

Example:

```
function f(x : int) : int
  Begin
    return x * 2
  End

Algo
  y : int
  Begin
    y <-- f(3)
    print y
  End
```

6. Error Handling

Any error detected during execution (undeclared variable, type mismatch, index out of bounds, etc.) immediately halts the program with an explicit error message.

7. End of Execution

When all instructions in the main block have been executed:

- Results are displayed in the console (or captured if redirected)
- The program terminates normally if no error was raised

Example of a Complete Executed Program

```
Algo
  a, b : int
  result : int
  Begin
    get a
    get b
    result <-- a + b
    print "Result :", result
  End
```

Summary

Execution in DAUPS follows a strict but predictable structure:

- No compilation: everything is interpreted dynamically
- Types and scopes are strictly enforced
- Error checking is systematic
- Functions and arrays are managed dynamically

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