The Algol 68 Jargon File

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Table of Contents

This file provides definitions for many terms used in the context of the Algol 68 programming language and associated technologies. You can find this file in other formats and the sources at `https://jemarch.net`.

1 Introduction

As C. H. Lindsey puts it in his legendary Informal Introduction to Algol 68, a language in which fundamental concepts combine in an orthogonal way requires very precise terminology. Algol 68 is the orthogonal programming language for antonomasia, and it for sure introduces a rich set of very precise terminology.

Furthermore, when the language got introduced the IFIP WG-2.1 took great care of using new terms for concepts that had their rough similar equivalences in other programming languages, instead of using the most common terms. Such is the case of *assignation*, which is similar but not exactly the same than the *assignment* of other programming languages. Many of the new terms are neologisms created for the occasion, also for good reasons as discussed below.

This all means that the Algol 68 programmers, implementors and aficionados need to get familiar with a very precise and somewhat extensive terminology. That may be quite confusing to the uninitiated.

As with most things related to Algol 68, mastering the terminology requires a little bit of effort and time, but believe me, it pays back in spades. Watching two Algol 68 programmers discussing about their programs is like watching two well greased machines: the terms they use are precise, and they can use terms referring to domain-specific concepts that would require the usage of a (probably not very well constructed on the fly) metaphor or analogy in other programming languages, and very little if anything is lost in translation. The communication is fast, rich and precise. It is also fun.

This jargon file is an attempt to gather and summarize this terminology for the benefit of anyone introducing herself in the enthralling world of algorithmic languages.

How to use this file

Each entry in the file describes the meaning of one particular term, including a more or less extensive description of the entity or concept described by the term. This usually involves programming examples, but note that the purpose of this file is *not* to be an Algol 68 manual. Usage examples *of the term* are shown in the form of hypothetical dialogues. When applicable, the syntax of the concept associated with the term will be also explained as simplified syntactic rules from the Report. Finally, references to other entries or to the bibliography are included in the entries.

So how to look for a term in this file?

If you are reading this document in an *info* reader, then you can press `m` and introduce the term you are looking for. Your info reader shall be nice enough to provide auto-complete. References can then be followed the same way.

If you are reading this document as a man-page, then you will find references to all the entries of the jargon file in the `SEE ALSO` section below.

If you are reading this document as a PDF, then you can use either the table of contents or the concepts index you can found in the appendices. Depending on how nice your PDF reader is, and assuming you are not reading a printed document, you can probably follow the references by clicking on them.

If you are reading this document as an HTML in some website, then you can follow the hyperlinks in table of contents and indexes.

Bibliography and references:

- The Revised Report on the Algorithmic Language Algol 68 By A. van Wijngaarden, B.J. Mailloux, J.E.L Peck, C.H.A. Koster, M. Sintzoff, C.H. Lindsey, L.G.L.T. Meertens and R.G. Fisker.

  Referenced by marks like [RR *section*].

- The Informal Introduction to Algol68 By C.H. Lindsey and V.D. Meulen.
  Referenced by marks like [II *section*]

2 Representation

3 Language

3.1 Contraction

Meaning

Certain language constructions which can be cumbersome for the programmer to write can be "contracted" into equivalent forms. The resulting shorter form is called a *contraction*. The constructions that can be contracted are:

- Collateral variable declarations.
- Collateral identity declarations (constant declarations).
- Identity declarations of routine modes.
- Priority declarations.

See for example the following collateral declaration of several variables of the same name, followed by it's corresponding contraction:

```
int size, int offset, int value := 1024;
int size, offset, value := 1024;
```

In the contracted form above, the same actual declarer (**int**) is shared among all the declared variables. The elaboration is still collateral, as implied by the comma separator.

The same can be applied to identity declarations. If we turn the variables above into constants, we have:

```
int size = 0, int offset = 0, int value = 1024;
int size = 0, offset = 0, value = 1024;
```

Note that you cannot mix variable declarations and constant declarations in the same contraction. If you tried to do:

```
int alignment = 1, int value := 1024;
int alignment = 1, value := 1024;
```

The first collateral declaration is perfectly valid, but the resulting contraction is not. The reason is that in the variable declaration for `value` the mode at the left is an actual declarer that generates a new name to hold the value, whereas the mode at the left in the identity declaration for `alignment` is a formal declarer. This becomes more clear if we explicit the generator in the variable declaration:

```
int alignment = 1, loc int value := 1024;
int alignment = 1, value := 1024; # BAD #
```

Identity declarations of routines can become clunky:

```
proc([]real,real)real waverage = ([]real numbers, real weight) real:
begin
  ...
end
```

The corresponding contracted form, where the actual declarer is shortened to **proc**, would be:

```
proc waverage = ([]real numbers, real weight) real:
begin
  ...
end
```

Note however that the contraction form of a routine declaration is less expressive than the uncontracted form. In the contracted form it is required for the right hand side to be a routine text. That is not the case in the uncontracted form, in which the right hand side can be any unit yielding a routine of the expected mode, like in:

```
proc(int,int) transformer = (op = add
                             | int(int a, int b)int: a + b
                             | int(int a, int b)int: a * b);
```

Finally, collateral declarations of the priority of operators can also be contracted in the expected way:

```
prio isoneof = 6, prio ismanyof = 6;
prio isoneof = 6, ismanyof = 6;
```

Syntax

Simplified [RR 4.1.1.b:c]:

```
b) COMMON joined definition of PROPS:
     COMMON joined definition of PROPS, and also token, joined definition of PROP.
c) COMMON joined definition of PROP:
     COMMON definition of PROP.
```

Note that `and also token` is the comma symbol in most representations.

The rules above are used in the syntax of all the constructs mentioned in this article. For example the following simplified rule [RR 4.3.1.a] implements priority declarations:

```
a) priority declaration of DECS:
     priority token, priority joined definition of DECS.
```

Where `priority` plays the role of `COMMON` and `DECS` of `PROPS`. The rules for the other constructions are built the same way, so we are not including them here.

See Also

- [II 1.1.3,2.1.2,4.2.2.1]
- [RR 4.1.1.b:c]

3.2 Longsety

Meaning

A *longsety* is a sequence of zero or more **long** bold tags. The term follows the fashion of the Revised Report, where the suffix `-ety` means “or empty”.

The Algol 68 modes **int**, **real**, **compl**, **bits** and **bytes** can be prefixed with any number of **long** tag words. The effect of each **long** is to double the precision of the mode.

At some point, however, a “saturation” point is reached where the addition of extra **long** has no further effect on the mode. Where that point resides is up to the particular implementation.

For example, if the precision of **int** is four bytes or 32-bit, the precision of **long int** is 64-bit, and the precision of **long long int** is 128-bit.

Syntax

Simplified [RR 1.2.1.E]:

```
LONGSETY :: long LONGSETY ; EMPTY.
```

See Also

- Section 3.3 [Shortsety], page 7,
- Section 3.4 [Sizety], page 7,

- [II 2.7.2]
- [RR 1.2.1E]

3.3 Shortsety

Meaning

A *shortsety* is a sequence of one or more **short** bold tags. The term follows the fashion of the Revised Report, where the suffix `-ety` means "or empty".

The Algol 68 modes **int**, **real**, **compl**, **bits** and **bytes** can be prefixed with any number of **short** tag words. The effect of each **short** is to half the precision of the mode.

At some point, however, a "saturation" point is reached where the addition of extra **short** has no further effect on the mode. Where that point resides is up to the particular implementation.

For example, if the precision of **int** is four bytes or 32-bit, the precision of **short int** is 16-bit, and the precision of **short short int** is 8-bit.

Syntax

Simplified [RR 1.2.1.F]:

```
SHORTSETY :: short SHORTSETY ; EMPTY.
```

See Also

- Section 3.2 [Longsety], page 6,
- Section 3.4 [Sizety], page 7,
- [II 2.7.2] [RR 1.2.1.F]

3.4 Sizety

Meaning

A *sizety* is either a *longsety* or a *shortsety*. The term follows the fashion of the Revised Report, where the suffix `-ety` means "or empty".

For example, the sizety of a mode declared as **long long bits** is **long long**.

Usage

This term is useful in order to inquiry the number of size modifiers some particular mode has, like in:

- *"What is the sizety of* **file_size***?"*
- *"The sizety was wrong, I changed it to long long."*

Note that this is not exactly the same than asking for the precision of **FILE_SIZE**. The sizety implies some particular precision, but only indirectly.

Syntax

Simplified [RR 1.2.1.F]:

```
SIZETY :: long LONGSETY ; short SHORTSETY ; EMPTY.
```

See Also

- Section 3.2 [Longsety], page 6,
- Section 3.3 [Shortsety], page 7,
- [II 2.7.2] [RR 1.2.1.F]

3.5 Structure Display

Meaning

When a collateral clause is in a strong context where a primary yielding a structure value is expected, its constituent units are elaborated collaterally as usual, and the resulting values used to conform the value of the fields of a new structure value of the expected mode. These collateral clauses are called *structure displays*, and play the role of structure denotations in Algol 68.

The constituent units of a structure display are known as the *field positions* of the structure display. They are always elaborated in strong context with the mode of the corresponding structure mode field expected. The units are elaborated collaterally.

Consider the following structured mode with a couple of **real** fields and the declaration of a constant of that mode:

```
mode vector = (real x, y);
vector v1 = (3.14, 10)
```

The right hand side of an identity declaration is a strong context, and therefore the required mode is known at compile-time. In this case the mode expected is **vector**. The collateral clause `(3.14, 10)` can then recognized as a structure display of that particular mode, and its constituent units `3.14` and `10` become strong field positions with expected mode **real**. This allows the widening of `10` to `10.0` in this case.

When the context is not strong, however, structure displays cannot be recognized as such. Consider the following operator that adds two **vector**s:

```
op + = (vector a, b) vector:
   (x of a + x of b, y of a + y of b)
```

Again, the structure display in the body of the routine text ascribed to the operator `+` is in a strong context expecting a **vector**, so no problem there. But then consider the following formula that uses the just defined operator:

```
(1, 2) + (3, 4)
```

That is not valid code and a compiler will complain. The operands of a formula are in firm context, and the collateral clauses are recognized as such, which are *void units*. To remedy this we are forced to use casts in order to surround the collateral clauses with a strong context with required mode **vector**:

```
vector (1, 2) +  vector (3, 4)
```

Note that structure displays must have two or more field positions, or certain syntactic ambiguity known as *Yoneda's ambiguity* would arise: given **mode** = **m** (**ref m** `m`); **m** `nobuo, yoneda`; the assignation `nobuo := (yoneda)` is ambiguous. This difficulty can be easily circumvented by using the non-ambiguous `m` **of** `nobuo := yoneda`.

Syntax

Simplified [RR 3.3.1.e:h]:

```
FIELD :: MODE field TAG.

e) strong structured with FIELDS FIELD mode collateral clause:
     FIELDS FIELD portrait.
f) FIELDS FIELD portrait:
     FIELDS portrait, and also token, FIELD portrait.
g) MODE field TAG portrait:
     strong MODE unit;
h) *structure display:
     strong structured with FIELDS FIELD mode collateral clause.
```

Note that `and also token` is the comma symbol in most representations.

Note how the structure mode in `e` has at least two fields.

See Also

- [II 3.4]
- [RR 3.3.1.e:h]

4 Implementation

5 Other

5.1 Orthogonal

Meaning

Adriaan van Wijngaarden championed the notion of *orthogonal programming language* and applied the notion in all its strength in the design of Algol 68. An orthogonal programming language is one such that it comprises a number of primitive independent concepts which are then applied in an orthogonal way. This makes the language very expressive, reduces the number of arbitrary rules (which the programmer has to remember) and avoids redundancy.

There are many examples of orthogonality in Algol 68. In fact, what is seldom found are arbitrary rules! One nice example is: take the notions of the comma separator `,` (in the Report that symbol is known as the *and also token*), collateral clauses, parallel clauses, declarations, multiple sub-scripting, actual argument passing, row display and structure display. These concepts are all independent. Now let's establish a rule: the comma separator implies collateral elaboration. Then let's apply this rule "orthogonally" by combining the concepts above.

Starting with the most obvious example, the units in the following collateral clause are elaborated collaterally, no surprise there:

```
(x * 2, y / 2)
```

If the following parallel clause there is still collateral elaboration, and it would be expected:

```
par begin generate data (), consume data () end
```

But then the indexes in the following multiple subscripting are also elaborated collaterally:

```
play voice ((monster at[get x (current map), get y (current map)]))
```

The actual parameters in the following procedure call are elaborated... collaterally!:

```
encrypt buffer (str, get random (seed))
```

The following contracted identity declarations are elaborated, surprise surprise, collaterally:

```
[]real randoms1 = get random (seed), randoms2 = get random (seed)
```

The field positions in the following structure display are also elaborated collaterally:

```
maintainer maint = (default name,
                    default url,
                    get last package (packages))
```

You get the point: there is no Algol 68 code where a comma separator doesn't imply collateral elaboration. Out of strings, comments and pragmats that's it. The programmer is only required to remember a number of N+M concepts (like the ones enumerated above) instead of the effect of combining them in N*M different combinations.

Algol 68 is not absolutely orthogonal, it has rules that introduce exceptions. An example is: "sizety modifiers can be applied to **int real**, **complex**, **bits**, **bytes** modes, but not to structured or rowed modes".

Usage

- "Algol 68 is an orthogonal programming language".
- "In this language concepts are applied orthogonally".
- "That rule you mention is not orthogonal".

See Also

- [RR 0.1.2]

5.2 Uninitiated Reader

Meaning

The original Report on the Algorithmic Language Algol 68, accepted in December 1968, was notoriously difficult to read, not only because of the usage of the two-level grammars and formal representation, but also because it lacked pragmatic descriptions.

The Revised Report, accepted at the end of 1973, incorporated many improvements in the described language, but also added many pragmatic descriptions to improve the readability. It also acknowledged the reported difficulties in the following famous paragraph in [RR 0.1.1]:

> "The Group wishes to contribute to the solution of the problems of describing a language clearly and completely. The method adopted in this Report is based upon a formalized two-level grammar, with the semantics expressed in natural language, but making use of some carefully and precisely defined terms and concepts. **It is recognized, however, that this method may be difficult for the uninitiated reader**."

It is to note that, although the readability problems were in their most part fixed by the Revised Report, which was a way more accessible document than the original report, the bad reputation of the later persisted and contributed to create FUD and the false impression that the described language (as opposed to the method of representation) was very difficult to learn.

Usage

The *uninitiated reader* or simply the *uninitiated* is sometimes used to refer to inexperienced programmers or users.

C. H. Lindsey dedicated his Informal Introduction to ALGOL 68 "To the Uninitiated Reader".

See Also

- [RR 0.1.1]

Concept Index

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