An Annotated Bibliography of the COMAL Language

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ABSTRACT

COMAL was first proposed as a programming language for use in schools over 15 years ago in Denmark, but is still only known and used by pockets of enthusiasts. This bibliography should serve both to identify the many introductory articles, at least one of which should be accessible to almost every reader, and also provide pointers for those who wish to go further into the literature.

In the early 1970's, Borge Christensen translated the control structures of Pascal into BASIC's simple notational style, and added some other useful features such as long identifiers and named procedures. The result was COMAL.

He published his first articles in English language journals as early as 1975 [23,24]. From Denmark the language spread to England. From 1980 onwards, a number of publications appeared introducing the language, and proposing its adoption. These outlined the motivations, the history, the development, and applications of the language. The articles by Atherton [5, 6, 7, 8, 9, 11], Benwell [16], Bramer [18, 19, 20], Christensen [26, 28], and Marshall [56] are examples of such introductions.

COMAL was proposed as an alternative to BASIC both for home computers [3], and particularly for use in schools [34], and even for training professional programmers [37]. Atherton [13] reviewed some attempts to establish standards for BASIC, and suggested a European committee to guide the development of COMAL.

It was adopted by the Irish Government as the official programming language to be used in second level schools. This led to a series of publications in Riomhiris na Scol, the Journal of the Computer Education Society of Ireland. The article by Kelly [42] outlines both the history of the language, and the motivation for its adoption in Ireland. He includes a sample program to give a `flavour' of the language.

COMAL also reached the USA, possibly with some help from Ryan [69], where a number of articles were published introducing the language, and proposing it as an alternative to BASIC [22, 50, 70], particularly for educational use [2, 15, 17].

Not all contributions in the literature are so pro-COMAL, however.

In England, White [71] saw it as a possible threat to BBC and British Government plans for schools, both of which were centered on BASIC. Bull [21], referring to an article by Bramer [19], suggested that there was no need for COMAL, as it was just the draft BASIC standard under another name. Fox [35] also challenged the Comalites, particularly Atherton, claiming that it is too full of complexities and too difficult to learn to be of any real benefit.

In defence, Christensen appealed the decision to put BASIC on the BBC micro [25], and Atherton backed him up in this [10]. When this appeal failed, Atherton showed how BBC Basic could be made to emulate COMAL [14].

Following a similar pattern in Ireland, McCallion [58] gave a detailed description of a newly issued structured BASIC for the Apple][, and suggested that it was preferable to COMAL.

Some articles openly publicised particular commercial products. Miskelly [60] advocates his machine, the Piccolo, which was specially built for the education market. Wright [73, 74] and Gerrard [36] introduce COMAL for Commodore machines, while Miles [59] announces a cartridge version for the Commodore 64. Norris [66] introduces Acornsoft COMAL for the BBC micro.

Another series of articles dealt with extensions and enhancements to the language. Some of these attempted to supply for the lack of graphics in earlier versions. Norris [65] introduced the techniques for accessing the graphic routines in the Apple ROM from COMAL. Murphy [62, 63] produced a library of procedures for graphics and sound, including barcharts and even traditional Irish music.

High resolution graphics finally became available with the Commodore-64 version, and Kelly [43] and Lindsay [51, 54] demonstrated what could be done with this. A PC-based version of COMAL, using CGA and VGA cards, has now become available [4].

COMAL's kernal of keywords has been extended to include the basic instructions needed for process control. A demonstration of controlling a model washing machine is given in [40].

An object-oriented version of the language has been developed, running under either MSDOS or OS/2. UniComal, as it is called, can also use modules written in C or assembler [72].

Other topics covered here include disk directories [53], the use of COMAL for simulator programs [57], a PRINT USING facility [61], and the structure of the interpreter [67].

Some of the published work has been in the form of tutorials. M. Christiansen explained the characteristics and uses of closed procedures [32]. B. Christensen gave a tutorial introduction in three articles [29, 30, 31].

In Ireland, Apple won a contract to supply COMAL to schools, and published a tutorial to go with it [1]. Kelly produced a six part tutorial [44, 45, 46, 47, 48, 49].

Finally, there are a number of full books on the language, following the same geographical and chronological order as the earlier articles. The formal definition of COMAL-80 was published in Denmark in 1980 [68].

Atherton [12] and Christensen [27] were both published in Britain. Kelly's book [41] was aimed at the Irish market. Lindsay [52] produced a reference manual for the standard COMAL kernel, including a definition of the kernel. This, and Gratte [39], were both published in the USA. Lindsay [55] also produced a book on the use of graphics in Commodore COMAL.

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