POP-11 COMES OF AGE

The Advancement of an AI Programming Language

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Editor

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** In preparation*

CONTENTS

PREFACE

POP was officially born in 1968 with the publication of 'The POP-2 reference manual' in *Machine Intelligence 2*. Today POP-11 is the main POP Language and, following the custom of computer languages, though not of people, it shares its ancestor's birth and celebrates its 21st Birthday this year.

The language was first conceived by Robin Popplestone as COWSEL, but following a palace revolution, was re-named POP and then POP-1. POP-1 and MULTIPOP lead to the birth of POP-2 and proliferation into a large number of versions. This early history is told in chapter one by Robin drawing on a number of contemporary internal reports. This chapter conveys something of the flavour of the times and the development of high level languages on machines with a main memory of just 56 words. Today this feat is almost unimaginable.

In chapter two, Aaron Sloman describes the development of POP-11 from these early beginnings and shows why POP-11 is a superior language to LISP in many important ways. Indeed it was one of Robin Popplestone's ambitions in writing the early POP languages to overcome some of the intrinsic design faults of LISP. One aspect of the superiority of POP-11 is its tremendous flexibility whilst retaining computational efficiency. This allowed, even *provoked*, the development of the POPLOG programming environment which includes a full COMMON LISP, PROLOG, POP-11 and VED - a powerful visual editor.

Chapter three is an amusing vignette by Christopher Longuet-Higgins on the development of POP-11 or, as he prefers, POP-10.5. Following a life time's work in science, Christopher is now the honorary President of the Poplog and Pop Languages User Group. (He is also an emeritus Professor and Fellow of the Royal Society.)

In chapter four, Jonathan Laventhol attempts to reign-in POP-11 and show how it might be standardised. He argues that the language should be established in its own right as a useful high level language, regardless of its history in AI programming and teaching. In fact POP-11 *is* being standardised and should re-appear in 1991 as Pop91.

The prime mover of the standardisation effort is Steve Knight who wrote chapter five. This is a significant chapter on efficiency issues in AI programming in

general, though, of course, it deals mainly with POP-11. Steve also gives a careful appraisal of LISP, giving it due commendation where it is superior to POP-11. Though, if Steve's proposals are taken up, some version of POP will have an explicit parse tree to match LISP's.

Chapter six, by Mike Burton, describes the role of POP-11 in teaching. This is a good place for the reader unfamiliar with POP to start: it gives clear examples and references a number of introductory texts.

Chapters seven to eleven describe applications of POP-11.

Chapter seven, by Allan Ramsay, develops one of the themes of POP-11: its flexibility. It describes how very high level languages can be implemented in POP-11. This chapter is an updated version of his chapter which appeared in 'Artificial Intelligence Programming Environments', ed. Robert Hawley, Ellis-Horwood 1987. That book also describes POP-11 and the POPLOG environment.

Chapter eight, by Colin Shearer and Karen Osbourne, describes a commercial development of an induction system implemented in POP-11 which can generate decision trees in PASCAL, C, POP-11, LISP and PROLOG, based on examples given in an internal format or in POP-11 procedures or PROLOG predicates.

Chapter nine, by Graham Winstanley, John Kellet, Jeffrey Best and Niall Teskey describes the result of many years research in the development of knowledge elicitation tools for expert systems. They give both a 'beginners' introduction to the field and indicate how effective and efficient tools can be built. This chapter shows some 'working' POP-11 code, rather than just artificial, polished examples.

Chapter ten, by Adrian Hopgood, Nicholas Hallam & Neil Woodcock, describes an expert system for the on-line interpretation of industrial ultra-sound images. In practice, this capitalises on POP-11's ability to make call-outs to external languages, such as C and FORTRAN which are supported automatically, or to arbitrary external code if the interface is hand-crafted from the general purpose tools. In recent years the external interface has proved very significant in the acceptance of POP-11 by industrial research groups of all kinds.

Chapter eleven, by Chris Price and John Hunt, describes a simulator of mechanical objects using FLAVOURS, a POP-11 library which provides an object-oriented programming language.

The remaining chapter describes an area of great future potential for POP-11.

Chapter twelve, by John Hunt and Chris Price, describes the support POP-11 gives to WIMP programming. WIMPs (Windows, Icons, Mice and Pop-up menus) have transformed the man-machine interface and are likely to lead to the ubiquitous acceptance of workstations. The existing POP-11 tools need further development before they can fully support this area.

This highlights a problem with POP-11. Because POP-11 is so flexible it attracts developments in many of the fashionable areas of AI and Computer Science, but it takes time for these to be reflected in the design of the language itself. POP-11 is unusual in this respect, that the demands of popular applications programs are supported by developments in the core language. This is nowhere more clear than in the two-level virtual machine, described in chapter two, which has instructions to support the popular applications PROLOG and LISP!

In the coming years POP-11 will face the competing demands for flexibility and computational efficiency which it has dealt with so effectively in the past. I wish POP-11 another 21 years of successful development.

Alex Morrison proposed this book, but business at his company, which sells ALPHAPOP, became so great that he could not carry the book through. I stepped in and did it.

ALPHAPOP can be bought in the United Kingdom from Cognitive Applications, 4 Sillwood Terrace, Brighton, BN1 2LR. ALPHAPOP and POPLOG, which includes POP-11, can be bought in the United States from Computable Functions Inc, 35 South Orchard Drive, Amherst, MA 01002. POPLOG can be bought in the United Kingdom from, Integral Solutions Ltd, Unit 3, Campbell Court, Bramley, Basingstoke, Hampshire, RG6 5EG. The Poplog and Pop Languages User Group can also be contacted at this address.

James Anderson

LIST OF TABLES

LIST OF FIGURES

LIST OF EXAMPLES