UNIVERSITY OF EDINBURGH
Edinburgh Regional Computing Centre

User Note 59

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Title:

Programming Languages on EMAS-3

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Synopsis

This User Note is one of a group that are being prepared to assist you in moving work from EMAS 2900 to EMAS-3. It describes the main programming languages that will be available, and in particular their differences from the versions available on EMAS 2900. This note does not describe the commands used to compile and execute programs, nor does it describe the facilities provided for calling operating system functions from within programs. These are covered in User Note 62.

Keywords

C, EMAS-3, Fortran 77, IMP80, Pascal, Programming Languages, Simula.

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Introduction

In determining which languages, and which particular dialects, to provide on EMAS-3 the following points have been considered:

- the use of existing languages on EMAS 2900
- the use of other languages, and dialects, on non-EMAS systems by EMAS users
- the availability of international standards for some languages.

This note covers the following languages:

C

Fortran 77

IMP80

Pascal

Simula

It is not intended to provide ALGOL 60 on EMAS-3. Other languages will be provided by groups outwith ERCC.

Apart from C, which is new to EMAS, it is intended that the transfer of programs from EMAS 2900 should be straightforward. The language defined libraries will be provided and will be similar to those on EMAS 2900. You will be able to transfer program source and data files to EMAS-3. Most of the tools used to manipulate them, for example editors, will be provided unchanged. There will, however, be major changes in the way programs call EMAS commands and access other facilities of the operating system. User Note 60 provides information of interest to all potential users of EMAS-3, and User Note 62 is intended for you if you are moving packages or complex programs to the system.

THE PROGRAMMING LANGUAGE C

There will be a C compiler available on EMAS-3. This will conform to the new ANSI standard syntax for the language. This compiler is being provided to assist UNIX users in moving applications software to EMAS-3. It is important to understand that the provision of the language C does not mean that all the UNIX support structure will be provided. However, a subset of the language support routines will be provided. User Note 63 will describe the implementation of C on EMAS-3.

FORTRAN 77

There will be a Fortran 77 compiler on EMAS-3. It is described in Reference 1. If you are already using Fortran 77 on EMAS 2900 your programs should run on EMAS-3 without change. If you are still using FORTE you should read User Note 57. It describes the additional

facilities in Fortran 77 and the differences from FORTE. If you are importing programs from elsewhere you will find that the compiler contains extensions to assist you.

IMP80

The only compiler for the programming language IMP on EMAS-3 will be an IMP80 compiler. This language is described fully in Reference 2. The differences between IMP80 and earlier versions of IMP are described in User Note 2.

IMP80 on EMAS-3 will be very similar to that on EMAS 2900. Briefly the main differences are:

- the %half %integers will not be supported. On the other hand %short %integers will be provided as on the System 4.

- Character input and output will be simplified, by removing the distinction between the CH and SYMBOL routines and functions.

These and other minor differences are described fully in User Note 58.

PASCAL

A totally new Pascal compiler is being developed for EMAS-3, based on a portable Pascal compiler from UMIST. This has been written to conform to the new International standard (BS 6192). The main new features within the standard, compared with the EMAS 2900 Pascal compiler are the provision of larger SETS (at least 256) and Conformant Array Parameters.

Conformant Array Parameters

This rather daunting title is the name of an important extension included in the new standard. It allows you to write and call procedures and functions which have arrays as parameters much more fluently than was possible with earlier versions. Pascal is described as a strongly typed language and one restrictive aspect of this typing was that the TYPE of every parameter passed to a procedure (or function) must be identical to the type described in the procedure. For example a procedure written to sort the contents of an integer array of 100 elements, could not be used to sort an integer array of 200 elements. Conformant array parameters can be used to write general procedures and functions such as one to sort an integer array of any size. There is still a restriction that the number of dimensions and the TYPE of the components must match, but this applies in most languages. The importance of this extension is not so much for the individual program: it is that it is now feasible to write general functions and procedures to be used by many programs.

Extensions outwith the standard

Consideration is being given to a number of extensions for the EMAS-3 Pascal compiler which are beyond the standard:

- String handling facilities.
- Separate compilation of program modules, allowing data and routines to be shared between modules.
- Cross calling to IMP80, Fortran 77 and C.
- Initialised variables.

Details of these extensions will be published later in User Note 64. Conformant arrays are fully described in the Pascal standard. See for example Reference 4 which includes the full text of the standard.

SIMULA

The Simula language will not be available on EMAS-3 when the service opens, but it is expected to be available before the close of the services on the 2900s. If you are already using Simula on EMAS 2900 you should be able to move your programs to EMAS-3, unchanged.

REFERENCES

1. The Edinburgh Fortran 77 Language Manual.
   Edited by N. Hamilton-Smith. ERCC.

2. The IMP80 Language. Felicity Stephens and John Murison. ERCC.

3. ERCC User Note 2 'IMP80 on EMAS 2900: Differences from IMP9'.
   J. Murison. ERCC.

4. A Practical Introduction to Pascal - with BS 6192.
   I.R. Wilson and A.M. Addyman. The Macmillan Press Ltd.