NEW PRODUCTS FOR FORTRAN DEVELOPERS FROM SALFORD SOFTWARE

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THE COMPANY

Salford Software Limited was founded in 1988 to exploit the potential of compiler developments made during the previous decade at the University of Salford. The company's aims are to provide software developers with fully supported leading edge language products, on a variety of widely-used platforms.

Salford has a history of contribution to the work of language standardisation, significant experience of Fortran 66 and Fortran 77 program portability and major achievements in Fortran 90, Fortran 77, PASCAL, C, LISP, PROLOG and other compiler developments.

THE PRODUCT RANGE

Salford's range of compilers currently consists of: our world beating Fortran 77 compiler FTN77, C/C++,Pascal (From the University of Sheffield) and FTN90, the world's first (and so far only) Fortran 90 compiler for PCs.

Every one of Salford's compilers uses the processor architecture to the full. They are all 32bit compilers with a flat memory model. The DOS products all come with a free 32bit DOS extender (DBOS) which gives a 2 giga-byte linear address space for code and data. This means that you don't have to worry about the 640k limit or 64k segment size under DOS.

SALFORD FTN90 COMPILER

Fortran 90 is an exciting new language that benefits from Fortran traditions and from modern trends in language design. All Fortran 77 programs are by definition, legal Fortran 90 programs. This protects the massive investment in existing Fortran software and programmer training. It is however the new facilities of Fortran 90 that bring the language up-to-date and ready for use into the 21st century.

FTN90 is a joint development effort between Salford Software and The Numerical Algorithms Group Limited. The partnership blends Salford's extensive experience of building and supporting language systems for Extended DOS and UNIX platforms with NAG's tremendous achievement in developing the worlds first Fortran 90 compiler (NAGWARE f90) which has been available worldwide since the new ISO Fortran standard was approved. Salford FTN90 is the world's first (and so far, only) Fortran 90 compiler for PCs.

The NAGWARE f90 compiler for UNIX systems consists of a pre-processor for Fortran 90 that converts Fortran 90 into the C language. The C code produced is then compiled using the host UNIX system's C compiler.

F90 was designed to a set of criteria that included the following:

> o Must be portable to as many platforms as possible.

> This was achieved by writing the compiler in C and using C as the target language instead of machine code.

o Must be a FULL implementation of Fortran 90.

A number of products are available which give some of the features of Fortran 90 but do not support the entire standard. F90 will accept the language in its entirety.

o Must give reasonable compilation speed and run-time performance.

F90 was not designed to be an optimising compiler. The pre-processor is quite fast, but does not attempt to optimise the C code it produces.

Clearly this set of criteria made an excellent basis for the conversion to the PC, but there were a couple of areas where Salford Software's aims were different:

o The compiler must produce machine code since a lot of PCs do not have a C compiler.

To achieve this the F90 pre-processor was modified to produce output that can be fed into the Salford code generation technology without producing a C source file. The code generator produces 32bit 80386 machine code that can be linked with Salford's 32bit linker.

o The compiler must have blindingly fast compilation and run-time speed.

In common with all of Salford's products, FTN90 is being improved all the time. The aim is that the compiler will eventually be as fast as the world renowned FTN77 compiler.

OTHER FEATURES

The compiler system includes a source level debugging system, which can be used to view the source code and the value of program variables during execution. This is a valuable aid to program debugging.

Load and go compilation. Like every other Salford compiler, FTN90 provides a facility that allows a program from a single source file to be compiled, linked and run or debugged, with a single command. This speeds up the edit-compile-link-test cycle enormously.

An entry level compiler is available which allows users to learn Fortran 90 without going to the expense of purchasing a full compiler. The entry level compiler supports most of the features of the full system, but will only work as a load and go compiler (as detailed above). This means that .OBJ and .EXE files can not be produced.

FUTURE DEVELOPMENTS

FTN90 is a very young product and is therefore lacking some of the 'bells and whistles' provided with FTN77. In keeping with Salford's traditional forward-looking approach to software support there are a great number of developments currently in the pipeline for FTN90:

o Further debugger enhancements.

o Mixed language programming interface.

This will allow users of other Salford compilers to use their existing libraries and object code with FTN90. In the new world of GUI Interfaces this will also allow developers to write their Windows user interface code in Salford C or C++ and to interface it to computation routines traditionally written in Fortran.

o Inline assembler.

An equivalent to the CODE - EDOC facility of FTN77 that allows developers to write in line assembler in any sub-routine will be included in a future release.

o Further improvements in the speed of compilation and run-time optimisation.

The aim is to provide the same blindingly fast compilation speed that users have come to expect from Salford compilers.

o Module based interface to DBOS libraries for maximum code reliability.

o Options and extensions to allow development of proper Windows applications in Fortran 90.

o DesqVIEW/X extensions.

Salford Software are working with QuarterDeck to produce a version of the DesqView/X libraries that will work with Salford compilers. This will enable the development of X Windows programs with Salford compilers.

FTN77 FORTRAN FOR THE WINDOWS NT OPERATING SYSTEM

Windows NT is the latest operating system from Microsoft. Salford expect it to follow the lead of MS-DOS and Windows and become a de-facto standard in the PC operating systems market. Windows NT is a 32bit operating system and thus dispenses with the memory management limits imposed by DOS. It has initially been aimed at the engineering workstation and server marketplace traditionally dominated by UNIX. It is inevitable however that the workstations and servers of today will rapidly become the desktop systems of tomorrow. A suitable machine to run Windows NT can already be purchased in the UK for the equivalent of 2000-3000DM.

Salford have ported the 32bit FTN77 compiler to the Windows NT platform. Salford believe this to be the first Fortran 77 compiler for the Windows NT operating system. Making it the company's second world first of 1992. A beta test program will begin in the middle of December 1992, and the first release will be towards the end of the first quarter in 1993.

PORTING FROM UNIX AND DOS.

FTN77 is itself an application written in FTN77. This gave us a useful insight into porting applications with the compiler. Using our considerable in-house experience of 32bit code generation, we were able to move the compiler to Windows NT extremely quickly. Less than five weeks from the beginning of the project, the compiler was able to compile itself on the

Windows NT platform. This shows the ease with which FTN77 applications will be able to be moved from UNIX and DOS to run under the new compiler.

FTN77 comes complete with a run-time library which supports low-level file access, bit manipulation, sorting, storage heap management etc.. It will also interface to third party libraries. Future developments will almost certainly include a port of the DOS graphics, mouse and windows routines in the FTN77/x86 run-time library.

MINIMAL DEVELOPMENT TIME

FTN77 has always been one of the fastest Fortran compilers on 386/486 systems. In fact, the UNIX based compiler is up to five times as fast as at least one competitive product. FTN77 can compile around 55,000 lines of Fortran per minute on a 33Mhz 486 running under the preliminary release of the Windows NT operating system.

RUN TIME PERFORMANCE

FTN77 programs have excellent run-time performance.You can compile with or without global optimisation, and you can produce executable files from any combination of optimised and un-optimised routines.

INTER LANGUAGE INTERFACE

Code produced by FTN77 will interface with code compiled using the Microsoft C/C++ compiler supplied with the preliminary release of the Windows NT operating system for developers. This means that you can write your Windows user interface code in C and interface to calculation intensive code written in Fortran 77. Interfaces to other languages will be included (if necessary) as and when other compilers become available.

BUILT-IN ASSEMBLER

A built-in assembler feature allows you to include symbolic assembler statements anywhere in any Fortran subroutine.

STANDARD OR EXTENDED SOURCE LANGUAGE

The source language is full ANSI Fortran 77 plus extensions (including most of MIL-STD-1753). All FTN77 compilers are validated annually to confirm conformance with the US Federal Fortran Compiler Validation Suite. The -ansi compile time option allows you to ensure that your program conforms to the Standard. Other options allow Fortran 66 programs to be run without source changes.

FROM FULLY CHECKED TO PRODUCTION CODE

Compile-time options allow you to choose amongst fully checked code, locally optimised code and globally optimised code. Any routine can be compiled in any mode and link loaded with routines compiled in any of the other modes. The checking options automatically pinpoint the source line where a Fortran language violation, such as mismatched arguments or arithmetic overflow, has taken place.

SOURCE LANGUAGE AND EXTENSIONS

FTN77 accepts Fortran 77 source programs as defined in ANSI X3.9 (1978). The compiler will also process programs which contain a large variety of popular language extensions, including most of those specified in MIL-STD-1753, together with a number of extensions which are unique to FTN77.

Except for Hollerith data, these extensions are not described in the ANSI Standard. They have been provided both in order to allow programs to be ported from other Fortran environments and to facilitate systems software development (FTN77 is developed using itself).

In order to be certain that you are writing a standard conforming Fortran 77 program, you should use the -ansi compiler option.

INPUT/OUTPUT EXTENSIONS

FTN77 provides a wide variety of input/output extensions including the use of list-directed input and output with internal files and the use of non-character arrays for format specification. Character data may be read into non-character variables using either list-directed or formatted input.

Der Vortrag von Tim Bartle lag bis zum Redaktionssssschluß leider nicht vor.

Die Unterlagen können aber beim Referenten selbst angefordert werden.