SEMINAIRE MATHEMATIQUE-INFORMATIQUE

Projet SAFIR
UNSA - INRIA - CNRS :
«*Systèmes Algébriques Formels pour l'Industrie et la Recherche* »

Lieu: *INRIA*,
2004, route des Lucioles,
Sophia Antipolis,
Salle E003.
Autre accès: `http://www.inria.fr/safir/MEETING/seminaires.html`

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Le vendredi 1er Mars à 14 Heures, Salle 003 :

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«*Computer Algebra Systems as Numeric Interfaces* »

We describe work by Mike Dewar, Mike Richardson, Michael McGettrick, Godfrey Nolan, Ian Meikle, Bill Naylor, Brian Dupée and Simon Atkins. This team has achieved the following.

- An interface (called IRENA) between Reduce and the Nag Fortran Library — the library contained 700 routines, so full interfaces were developed to about 100 of them. This involved a great deal of work in developing uniform treatments of concepts like 'rectangles', which do not exist in Fortran, are natural to provide in a higher-level interface, and do not have a uniform parameterisation in the Nag library.
- An interface between Axiom and the Nag library, available in Axiom 2.0 and beyond. This builds on the lessons learnt from IRENA, in particular the communications technology (now using a separate process, potentially on a remote machine) and the user interface (now a hypertext "fill in the boxes" interface of the same style as Axiom's "basic commands").

*This work was partially supported by the UK's Teaching Company Scheme and Joint Informations Sevices Committee

- A higher-level interface to `D03PSF`, a routine for solving hyperbolic PDEs, with 39 parameters, six of which are subroutines with a total of 59 parameters, and one of which is an array of 30 interacting options. Here we have developed both a generic interface (of the same style as above) and an interface to a specific PDE, Burger's equation $\frac{\partial u}{\partial t} - \frac{1}{2}\frac{\partial u^2}{\partial x} = 0$, which also incorporates calls to Axiom's graphical capabilities to display the result.

- An "expert system" ANNA, which takes a description of the mathematical problem (using the same style of interface) and decides which Nag routine would be most suitable for the problem, and then calls it via the interface already developed. Alternatively, the system may perform a symbolic transformation first. This system is intended for non-experts and for use in teaching.

- A "browser" for large symbolic structures such as matrices. This is designed to help with the situation where a symbolic system spits out a large number of lines for a single result, so that the user cannot see the wood for the trees.