An overview of the SCIEnce Project

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Introduction
It should be first stated that this presentation has no claim for originality and that its author has no personal merits in the works that are described here, his team being mostly involved in other tasks of the project.

The aims of SCIEnce [3] are to allow sharing components of computer algebra systems, to make CAS interoperable through suitable Web services and to make them ready for the use of Grid computing. The project started on April 1st 2006 for 5 years. It involves developers of four major CAS: GAP, KANT, Maple, and MuPAD.

As the DART community may be interested by computation tools that are not available in a single CAS, and also in specialized softwares, such as BLAD [2] or MuPAD. We may however notice the existence of the CD differential equations on the Web” Mathematical Knowledge Management, LNCS 319, 2004, 104-115.

We see that the Popcorn notation is easier to handle. It is nevertheless possible for specific applications to use their own format, encoded in a private CD, or using openstring, ombytes or om-foreign.

With the long term goal of proving or certifying algorithms used in computer algebra systems, a Computer algebra object internalisation in Coq proof assistant has been provided [3].

Software composability
The work on software composability is mostly centered on SCSCP (Symbolic Computation Software Composability Protocol)[8, 9], a remote procedure call framework with two main specifications: it allows the exchange of protocol messages and data, and it is implemented in the form of looking for possible occurrences of a given differential equations on the WEB.

Conclusion
It is not clear that the success of a standard is due to its quality, nor that it fails to be adopted because of its technical drawbacks. It seems rather in many cases that it is just a question of critical mass and initial success, for unknown reasons. People develop the standard because they feel it will become a reference and such a process is self-sustained.

Related tools
A Java library has also been developed, that supports OpenMath representation and also offers EclipseXport.

OpenMath has been designed for communication between computers, not humans. So, an OpenMath representation convenient for direct user interaction, which stands for “Only Practical Convenient OpenMath Replacement Notation”, has been developed. The Java library mentioned above also supports Popcorn.

Some CD, such as polyqpa, provide definitions for multivariate polynomial, adapted for Groebner bases computations, considered in polyqpa and polyqp buffer. I found nothing for differential polynomials, or for characteristic sets, even in the pure algebraic case.

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Mathemagix + TeXmacs
A special advertising for good friends doing good work...

Mathemagix is a free computer algebra system under development. The main contributors are Joris van der Hoeven, Gregoire Lecerf and Bernard Mourrain. It provides a high level, strongly typed language, together with packages, written in C++. These packages are connected to the interpreter, but can also be used separately. A compiler is under development.

The existing libraries cover the basic needs of computer algebra, and more...

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WUPSI (Universal Popcorn SCSCP Interface) is a command line that can be used to access an arbitrary number of SCSCP servers, possibly in parallel and to exchange data between them. It can also be used to retrieve information on OpenMath symbols or be used as a manual SCSCP sever.

Differential equations in OpenMath
I will try here to give a few examples of the OpenMath syntax. The most basic definitions are to be found in OpenMath CD (Content Dictionary) [4]. This looks like OpenMath.

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A new grid framework, SymGrid has been developed. Maple, GAP, KANT and MuPAD are initially integrated into the project. These heterogeneous symbolic components may be used together, possibly in parallel.

The project includes two main components: SymGrid services, a generic interface to grid services, provides an interface to Grid and Web services that relies on OpenMath. SymGrid-Par is built around GRID-GUM, a system designed for parallel computation on the Grid, with adaptations for symbolic engines, using again OpenMath.

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