Communicating using sockets via TCP/IP protocol

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The OpenMath-based protocol for symbolic software composability

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We address modern needs of symbolic computations:
- infrastructure for implementing parallel algorithms
- tools for combining capabilities available in several different systems
- deployment of symbolic computation resources, such as databases or specialized software as Web services or Grid services accessible over the Internet

SCIENCE – Symbolic Computation Infrastructure in Europe (http://www.symbolic-computation.org)

The SCIEnce project unites efforts of developers of computational algebra systems from:
- GAP (http://www.gap-system.org)
- KANT/KASH (http://www.math.tu-berlin.de/~kant/kash.html)
- Maple (http://www.maplesoft.com)
- MuPAD (http://www.mupad.de)

SCSCP – Symbolic Computation Software Composability Protocol:

We are working towards providing an OpenMath-based protocol for inter-CAS communication by which a computer algebra system (CAS) may offer services for the following clients:
- a Web server which passes on the same services as Web services using SOAP/HTTP protocols to a variety of possible clients;
- Grid middleware;
- another instance of the same CAS (in a parallel computing context);
- another CAS running on the same computer system or remotely.

As well as transmission of actual mathematical objects, we support transmission of references, which can be used in subsequent requests. For example, we envisage the possibility to construct and manipulate large mathematical objects on remote grids with sending over the Internet only the properties the user is interested in. Proofs of concept are available in KANT/KASH and GAP.

SCSCP specifies:

- remote procedure call
- returning result if the procedure was completed successfully
- returning a signal about procedure termination and also allowed sequences of these messages.

Example of procedure_completed message

The procedure GroupIdentificationService evaluated the procedure_call message and determined that the permutation group has the number [6,1].

Example of procedure_call message

The procedure GroupIdentificationService accepts the list of permutations and returns the catalogue number in the GAP Small Groups Library of the group they generate (unspecified options will take their default values):

Example of OpenMath Code for Symbolic Computation

The OpenMath-based protocol for symbolic software composability

The OpenMath-encoded communication between CASes is hidden from the user.

References:


OpenMath (http://www.openmath.org)