

## E-Lotos: A new standard for asynchronous timed systems

The E-Lotos (Enhanced Lotos) language became a ISO/IEC international standard last september. This is the result of a long development work from 1992 to 2001, in which project Vasy of INRIA Rhône-Alpes actively took part.

An interview with **Hubert Garavel**, head of Vasy

*INédit* : What is E-Lotos?

**Hubert Garavel** : E-Lotos is a language that can be used to describe systems composed of agents that execute in asynchronous parallelism, communicate by messages and obey certain temporal constraints such as delays or urgency. It is a very general semantic framework that can be applied to hardware, software and telecommunication systems. On the technical side, E-Lotos is based on theoretical results on functional and imperative languages, process algebras and times automata. E-Lotos is meant to replace its predecessor, Lotos in 1989, by providing numerous extensions, and easier learning.

*INédit* : What about its impact on critical system reliability?

**Hubert Garavel** : The verification of critical systems is an important and difficult problem, for which there are two approaches. The first approach consists in attempting to verify programs written in the usual programming languages (C, Java and so on). It is easily accepted since it does not change anything in the programmers' habits. In fact, the bulk of the work falls on the persons in charge of the verification. They have to find the right simplifications and abstractions that make verifying the written code feasible. E-Lotos pertains to the second approach based on higher level languages that present a good compromise between the expressiveness offered to programmers and the demands related to verification methods. These latest generation formal methods are at the heart of the work of project Vasy. ■

### Contact:

**Hubert Garavel**, project Vasy, INRIA Rhône-Alpes

Tel.: +33 4 76 61 52 24, [Hubert.Garavel@inria.fr](mailto:Hubert.Garavel@inria.fr), <http://www.inrialpes.fr/vasy/>

## Books

### MATHEMATICAL PROBLEMS IN IMAGE PROCESSING

**Gilles Aubert and Pierre Kornprobst**  
Applied Mathematical Sciences, Vol. 147  
Springer-Verlag, december 2001, 312 pages.

Partial differential equations and variational methods were introduced into image processing about 15 years ago, and intensive research has been carried out since then. The main goal of this work is to present the variety of image analysis applications and the precise mathematics involved. It is intended for both the mathematical and the computer vision communities. ■

*Pierre Kornprobst is a collaborator to project Robotvis, INRIA Sophia Antipolis.*

### FUNDAMENTALS OF CONVEX ANALYSIS

**Jean-Baptiste Hiriart-Urruty and Claude Lemarechal**  
Springer, serie Grundlehren Text Editions, 2001, 269 pages.

This book is an abridged version of the two volumes convex analysis and minimization algorithms i and ii (Grundlehren der mathematischen Wissenschaften Vol. 305 and 306), which presented an introduction to the basic concepts in convex analysis and a study of convex minimization problems. ■

*Claude Lemarechal is a collaborator to project Numopt, INRIA Rhône-Alpes.*

PUBLISHER: Bernard Larrourou

EDITOR: Françoise Breton

EDITORIAL COMMITTEE: Marie Collin, Patrice Gelin, Christine Genest, Gérard Giraudon, Bernard Hidoine, Sabah Khalfa, Laurent Kott, Ana-Maria Militan, Gérard Paget, Georges Nissen, Annick Theis-Viemont, Jean-Pierre Verjus, Thierry Vieville.

CARTOON: Denis Pessin

TRANSLATION: Catherine Le Dret

GRAPHIC DESIGN: Vincent Hélye - Rennes

PRINTING: Média Graphic - 23, rue des Veyettes - Rennes

Registration of copyright: march 2002 - 3200 - 5 issues per year

ISSN: 1267-5164. Commission paritaire: 3125 ADEP

INédit # 33, march 2002

### INRIA IS ORGANIZING OR CO-ORGANIZING

#### ▶ ROCQUENCOURT COLLOQUIUM

Software patents and free software: What use is left for public research in computer science?  
Jean-Paul Smets, Nexedi SARL  
February 12, 2002, Rocquencourt

#### ▶ IS2 DIDACTICS MEETING ON MIXED MODELS

March 8, 2002  
Montbonnot Saint-Martin  
Inria Rhône-Alpes

#### ▶ ROCQUENCOURT COLLOQUIUM

Chirps everywhere  
Patrick Flandrin, CNRS-Ecole Normale Supérieure de Lyon  
March 19, 2002, Rocquencourt

#### ▶ CEA-EDF-INRIA TUTORIALS

Data assimilation for geophysical fluids  
March 25–29, 2002  
Rocquencourt

#### ▶ WEHSFF02

West-east high-speed flow field  
April 22–26, 2002, Marseille

#### ▶ RHDM'02 SUMMER SCHOOL

High Speed Networks and Multimedia  
Mai 6–10, Autrans, Isère

#### ▶ EJC 2002

Young researchers in programming school  
May 20–31, 2002  
Irisa, Rennes

### INRIA SPONSORS

#### ▶ STACS 2002

19<sup>th</sup> International Symposium on Theoretical Aspects of Computer Science  
March 14–16 mars, 2002  
Antibes, Juan-les-pins

All the tutorials and conferences are on the Web:  
<http://www.inria.fr/actualites/colloques/index.fr.html>

### TO GET IN TOUCH WITH INRIA OR RECEIVE INÉDIT:

Scientific Information and Communication Service

Telephone: +33 1 39 63 55 18

Fax: +33 1 39 63 59 60

[inedit@inria.fr](mailto:inedit@inria.fr)

<http://www.inria.fr>

INRIA INédit - BP 105 - 78153 Le Chesnay Cedex - France



INédit is also on the Web in english, with more information proposed by the editorial committee: images, interview, related links (in french).  
<http://www.inria.fr/actualites/inedit/index.en.html>