

Application BASTRI

Fiches Equipes

NOVALTIS (SR0364BR)

NOVel ALgorithms and VALidation Techniques for Time-critical and high Integrity Systems
NOVALTIS

Statut: Terminée

Responsable : Gerard Le_Jann

Mots-clés de "A - Thèmes de recherche en Sciences du numérique - 2024" : Aucun mot-clé.

Mots-clés de "B - Autres sciences et domaines d'application - 2024" : Aucun mot-clé.

Domaine : Systèmes communicants

Thème : Systèmes embarqués et mobilité

Période : 01/12/2004 -> 31/12/2006

Dates d'évaluation :

Etablissement(s) de rattachement : <sans>

Laboratoire(s) partenaire(s) : <sans UMR>

CRI : Centre Inria de Paris

Localisation : Rocquencourt

Code structure Inria :

Numéro RNSR : 200421407F

N° de structure Inria: SR0364BR

Présentation

Background & Objectives:

NOVALTIS builds upon project REFLECS. New challenges are:

(A1) Models and Algorithms

- **Safety and liveness:** To explore most extreme **asynchronous** computational/system models, to specify and prove distributed algorithms in such models aimed at solving **agreement problems** in distributed fault-tolerant computing, while circumventing impossibility results (**research on the Theta-model**)
- **Timeliness and asynchrony:** To examine how to use purely asynchronous (time-free) algorithms or partially synchronous algorithms for solving problems in distributed **real-time** computing, where strict **timeliness** properties must be proven to hold (**research on the design immersion principle**)
- **Timeliness and overloads:** To investigate scheduling problems (algorithms, schedulability analyses, feasibility conditions) that arise with timeliness/scheduling attributes more complex than constant deadlines, assuming overloads are normal conditions (**research on the time utility function (TUF)-driven schedulers**)
- **Composed safety, liveness, timeliness and dependability.** To devise, specify, and prove algorithms directed at endowing a distributed computing system with a specific combination of safety, liveness, timeliness, and dependability properties (**research drawing from multiple disciplines, such as, e.g., Concurrency Control, Serializability theory, Distributed Algorithms, Scheduling theory**)

(A2) Proof-Based System Engineering (PBSE)

- To address issues arising with the **early phases in a project lifecycle** (application requirement capture, system design and forward validation), for systems bound to meet specified properties **very high coverage**
- To investigate how to maintain a **continuous chain of proofs**, from application requirement capture to implementation of a validated system-solution
- To introduce **system-level proof obligations in system engineering methods** used for real projects, notably proofs of combined safety, liveness, dependability, and timeliness properties
- To blend together **scientific rigor (proof obligations) and reality** (proof assumptions, design assumptions, must be shown to be provably

Contact

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En savoir plus

- Site de l'équipe
- Site sur [inria.fr](#)
- Derniers Rapports d'Activité :

Documents sur la structure

- [Intranet](#)
- [Privés](#)

Décisions

- 534 (01/12/2004) : création
- 5282 (04/12/2006) : fermeture

Localisation

- **Adresse postale :** Non renseignée
- **Coordonnées GPS :** 48.83703, 2.103342

- correctly implemented - not discarded as being "engineering/implementation details")
- To contribute to the development of **PBSE tools**

(A3) Analyses of causes of mishaps or failures:

- To examine **documented cases of mishaps, quasi-failures or failures** experienced with projects (before system deployment) and with deployed critical systems
- To **identify causes of difficulties**, with a special focus on system engineering faults
- Contributions to the **safety-critical forum** (moderated by York University, UK).

Publications

Axes de recherche

Scientific areas:

- (A1) System-level algorithms, specifications and proofs:**
Research on **computational/system models** and distributed **algorithms** for critical computing systems where combined safety, liveness, timeliness & dependability properties must be predicted
- (A2) System-level engineering methods:** Research on proof-based system engineering (PBSE) **methods** directed at critical and/or complex computer-based applications and systems
- (A3) Analyses of causes of mishaps or failures:** Diagnoses of real **causes of difficulties** experienced with **projects** (time/budget overruns, cancellations) and with **deployed critical systems** (failures or quasi-failures)

Major application domains (2005):

Defense (all forces), Aerospace (deep space exploration, earth orbiting vehicles, autonomous systems).

Relations industrielles et internationales

Established partnership with academia (2005):

- Vienna University of Technology, Austria
- Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- Virginia Tech, USA

Established partnership with industry (2005):

- DGA (French MoD)
- Members of the European Integrated Project ASSERT (Automated Proof-Based System & Software Engineering for Real-Time Systems, 2004-2007): ESA (European Space Agency), EADS-ST, Dassault Aviation, EADS-Astrium, Alcatel Space, Alenia, Axlog Ingénierie, CS
- Safran
- MITRE Corp., USA