Application BASTRI
Fiches Equipes

NOVALTIS (SR0364BR)

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

Statut: Terminée

Responsable : Gerard Le_lann

Mots-clés de "A - Thèmes de recherche en Sciences du numérique - 2023" : *Aucun mot-clé.*

Mots-clés de "B - Autres sciences et domaines d'application - 2023" : *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 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