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CAREER

PHD STUDENT | INRIA, COAST TEAM
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EFFICIENT (RE)NAMING IN CONFLICT-FREE REPLICATED DATA TYPES
Conflict-free Replicated Data Types (CRDTs) are data structures behaving as traditional ones, like *Set* or *Sequence* data structures, but designed for a distributed usage. They are used in order to build large scale distributed systems adopting the optimistic replication model known as eventual consistency to replicate data among nodes. With this model, each node owning a copy of the data can edit it without any kind of coordination with other nodes. They then propagate the updates to others. The specification of CRDTs ensures that concurrent updates are resolved deterministically and that replicas eventually converge after observing all of them.
To achieve convergence, CRDTs proposed in the literature mostly rely on identifiers to reference updated elements. According to the kind of CRDT, identifiers have to comply to several constraints (unicity, belonging to a dense set...).
Because of these constraints, the identifiers size is often not bounded. The size of metadata attached to each element increases with the number of updates. It thus exceeds more and more the size of data itself, decreasing the efficiency of the data structure over time.
The goal of this PhD is to address this issue by
  - Proposing more efficient specifications of identifiers according to their set of constraints,
  - Proposing mechanisms to rename identifiers to reduce their size.

RESEARCH & DEVELOPMENT SOFTWARE ENGINEER | INRIA, COAST TEAM
September 2014 – September 2017 | Nancy, France

PROJECT OPENPAAS::NG
The goal of this project is to design an open-source entreprise social network providing a suite of peer-to-peer collaborative office applications. The aim is to offer a reliable and free alternative to existing solutions such as Google Apps. This project is a joint work with the team DaSciM (Data Science and Mining) from the computer science laboratory from the Ecole Polytechnique, Linagora, XWiki SAS and Nexedi.
In this project, the COAST team works on topics such as the interorganisational federation of peer-to-peer systems and the securing of communications in this kind of collaboration. Furthermore, the team provides its expertise on eventually consistent data replication mechanisms in distributed systems.
In order to validate them, these works have been integrated in MUTE , peer-to-peer web based real-time collaboration editor.
  - Maintaining of LogootSplit implementation
  - Study of the literature on Conflict-free Replicated Data Types and of their use cases.
  - Development and integration of an anti-entropy mechanism

EDUCATION

MASTER DEGREE IN COMPUTER SCIENCE
Engineering degree in Computer Science at TELECOM Nancy
September 2011 – August 2014 | Nancy, France

PUBLICATIONS

[1] M. Nicolas. Efficient renaming in CRDTs. In *Middleware 2018 - 19th ACM/IFIP International Middleware Conference*, Rennes, France, Dec. 2018.

[2] M. Nicolas, V. Elvinger, G. Oster, C.-L. Ignat, and F. Charoy. MUTE: A Peer-to-Peer Web-based Real-time Collaborative Editor. Proceedings of 15th European Conference on Computer-Supported Cooperative Work - Panels, Posters and Demos, pages 1–4, Sheffield, United Kingdom, Aug. 2017. EUSSET.