The goal of this research project is to design a novel framework for safe dynamic reconfiguration of cloud applications by integrating into the platform software and extending the coordination mechanisms proposed by JavaBIP. To this end, this project will proceed in three steps.

The first step will consist in designing and implementing a model transformation tool that, based on an extended cloud feature model and a set of additional constraints, will automatically generate a JavaBIP model. Interfaced with an application, this JavaBIP model will be used at runtime to monitor the application and platform state. It will intercept reconfiguration requests and enforce the constraints ensuring that all intermediate configurations are safe.

The second step will consist in applying existing verification techniques for early detection of common problems such as deadlocks (reconfiguration cannot proceed) and livelocks (reconfiguration can proceed but the target configuration cannot be attained from the current one). Beyond detecting such problems, additional monitoring techniques could be applied to avoid them whenever possible.

The third step will consist in designing additional components and interfaces to be plugged into the JavaBIP model developed in step 1 so as to guide the reconfiguration process ensuring liveliness and...
optimality. In order to provide flexibility to the designers and maintainers of cloud applications and platforms, we are planning to include several options, such as 1) statically precomputed reconfiguration plans; 2) techniques inspired by simulated annealing, consisting of the alternation of random disturbances with periods of settling down aiming at the globally optimal configuration through a sequence of locally optimal ones; and 3) on-line constraintsolving.

Principales activités
- Research
- Preparation and submission of publications
- Communication
- Experimentation and validation
- State of the art review

Compétences
The following skills are required for this project:
- Knowledge of cloud computing
- Basics of formal methods (e.g. automata, predicate logic)
- Proficiency in the Java programming language
- Speak and write in English fluently

The following skills are not required, but could constitute a plus:
- Advanced knowledge of formal methods (e.g. temporal logic)
- Constraint programming

Avantages
- Partial reimbursement of public transport costs
- Subsidized meals
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Access to vocational training
- Possibility of French courses
- Social, cultural and sports events and activities

Rémunération
1st and 2nd year: 1 982€ Gross monthly salary (before taxes)
3rd year: 2085€ gross monthly salary (before taxes)