An Incremental Constraint Satisfaction Algorithm for Dynamic Reconfiguration

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Abstract

Dynamically reconfigurable systems are able to respond to changes in their operational environment by reconfiguring themselves automatically. Dynamic software product lines are dynamically reconfigurable systems with an explicit model of variability, which plays a key role in the reconfiguration process. In our work we use feature models for modeling variability. Features are mapped to the system's components that realize them. The feature model corresponds to a constraint logic program, and determines the valid configurations of the system. An emerging situation in the environment leads to relevant changes to the current configuration: some features must be activated, and some must be deactivated. Due to constraint propagation, the status of other features must be changed as well. However, we would like to avoid such changes to the extent possible so as to minimize disruption to the system's operation. We devised an incremental constraint satisfaction algorithm, based on Sannella's SkyBlue solver, that computes changes to be made to the current configuration so that the new configuration will be valid and satisfy the requirements of the new situation.

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