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Framework for Modeling and Reconstruction of Nuclear Accidents

Inverse modeling, also known as data assimilation, provides effective tools for reconstruction of a nuclear accident by the means of combining measured data with a numerical simulation of the accident. Application of advanced methods based on repetitive evaluation of the model, e.g. Monte Carlo methods, requires high computational power. This need becomes even more urgent when real-time analyses are performed. Our goal is to develop a system for modeling and reconstruction of nuclear accidents localized for Czech conditions. To ensure sufficient computational resources without extensive investments we attempt to develop a framework for construction of distributed computational environments using a large number of common personal computers connected to the internet. The framework is based on client-server architecture. The core components of the server side is a no-SQL database for storage of various data in different formats and a task scheduling service for communication with remote clients running computational codes. The framework can be used for construction of system dedicated to a single extensive task or as a computational base for multiple concurrent users. For the latter, a web-based user interface for configuration of desired task is provided. A decision support system based on the presented framework will be demonstrated.

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