Flood Forecasting in CrossGrid project

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Abstract. This paper presents a prototype of flood forecasting system based on Grid technologies. The system consists of workflow system for executing simulation cascade of meteorological, hydrological and hydraulic models, data management system for storing and accessing different computed and measured data, and web portals as user interfaces. The whole system is tied together by Grid technology and is used to support a virtual organization of experts, developers and users.

1. Introduction

Over the past few years, floods have caused widespread damages throughout the world. Most of the continents were heavily threatened. Therefore, modeling and simulation of floods in order to forecast and to make necessary prevention is very important. The kernel of flood simulation is numerical modeling, which requires an appropriate physical model and robust numerical schemes for a good representation of reality.

Simulating river floods is an extremely computation-intensive undertaking. Several days of CPU-time may be needed to simulate floods along large sections of rivers. For critical situations, e.g. when an advancing flood is simulated in order to predict which areas will be threatened so that necessary prevention measures can be implemented in time, long computation times are unacceptable. Therefore, using high performance computing platforms to reduce the computational time of flood simulation is imperative.

In ANFAS project [11], several flood models have been parallelized. Remote processing tools have been also created for running simulations on remote high performance systems automatically from client system. The simulation results can be imported to GIS system for visualization and analysis.

In CrossGrid project [12], meteorological and hydrological simulations are integrated into the system in order to forecast flood accurately. That requires cooperation between scientists in different areas, efficient data management system and a workflow system that can connect meteorological, hydrological and hydraulic simulations in a cascade. Therefore, Grid technologies are employed for implementing the system.

This paper will describe the Grid-based flood forecasting system (Flood Virtual Organization - FloodVO) that is developed in CrossGrid project, its current status and