Grid-based Virtual Organization for Flood Forecasting[1]

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Abstract

This paper presents a prototype of the Collaborative Problem Solving Environment for Flood Forecasting. Flood forecasting is a complex problem that requires cooperation of many scientists in different areas. To enable this cooperation in a manner comfortable to hydrometeorological experts, a part of the CrossGrid project is aimed towards developing a Virtual Organization support system, whose prototype is described here. The software consists of a cascade of simulation models, a storage system for computed and measured data and other used datasets, a web-based portal with collaboration tools and a powerful computation facility. 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 entire Europe. They have affected most of the European population and they resulted in heavy material losses. The need for better flood protection has become imminent.

In this paper we present the prototype of a problem-solving environment (PSE) [1] for the establishment and support of a virtual organization for flood forecasting (VO) [5]. The VO is intended to connect individual users as well as organizations involved in weather prediction and river management. The system uses Grid technology [2] to distribute meteorological, hydrological and hydraulic simulations across VO resources to minimize computing time and to shorten responses to VO members' requests.

The system is composed of a cascade of three simulation models - meteorological model, hydrological and hydraulic model. The whole cascade is able to predict water flow in a flooded area, but users may also to reduce their questions to simple weather prediction or to development of river level in a certain area (a hydrograph).

The interface of this PSE will be a WWW-based portal, enabling users to run simulations and evaluate results from anywhere in the world, using a simple computer with web browser and Internet connection. The front-end is a simple collection of web pages with options to run desired simulations. Behind this, a sophisticated collection of data, model codes, scripts and Grid middleware is hidden. The VO uses public-key based authentication mechanisms, enabling secure and private data transfer, processing and storage. Furthermore, the system enables users to exchange files and to communicate with each other.