Flood Forecasting in a Grid Computing Environment⋆

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Abstract. This paper presents a prototype of a flood forecasting system based on Grid computing. Flood forecasting is a complex problem that requires cooperation and coupling of many simulation models. To enable this coupling in an effective way, a part of the CrossGrid project is aimed towards developing a Grid Computing Environment (GCE) for flood forecasting, as described here. The Grid computing environment 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 Grid Computing Environment for Flood Forecasting, a system intended as a support tool for hydrometeorological experts. Grid computing environments (GCEs) have increasingly gained attention in the past few years. Advances in technological infrastructure as well as a better awareness of the needs of application scientists and engineers have been the primary motivating factors. In particular, the shift in emphasis from low-level application scheduling and execution [2] to high-level problem solving indicates that Grid comput is becoming increasingly important as a way of doing science. A GCE is a Problem Solving Environment (PSE) [1] with specifically formed computation kernel, using the power of Grid Computing. Good examples of some GCEs can be found in [8].

The system described herein is composed of a cascade of three simulation models - meteorological, hydrological and hydraulic ones. The whole cascade is able to predict water flow in a flooded area, but users may also reduce their

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