

# Evaluation of Suitability of Different Peer-to-Peer Technologies for Simulation Applications

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## Abstract

The paper evaluates fitness of different peer-to-peer technologies for usage in environmental, mainly flood simulation and flood prediction applications. Basic characteristics of peer-to-peer systems are introduced and compared to the requirements of flood modeling applications. Different architectures of distributed computational networks are presented and their usefulness for simulation applications is discussed.

In the next part the paper introduces checkpointing and process migration, basic techniques used in computational peer-to-peer networks. As a case study, an overview of Condor is given. Condor is considered the most mature peer-to-peer platform for distributed computing.

Finally, collaborative tools, as an inevitable tool for creating virtual organizations, are discussed. This review takes a special look on CHEF, a collaborative tool based on the Jakarta Jetspeed portal.

## 1. Introduction

This paper reviews different peer-to-peer technologies, which were developed as parts of many various projects. Each of these technologies originated as an answer for requirements of miscellaneous user communities. Some of the solutions are applicable only in the narrow problem area they were created for, other have proved their suitability for a wider domain of problems. The aim of this paper is to evaluate fitness of different peer-to-peer technologies for usage in environmental, mainly flood simulation and flood prediction applications.

### 1.1 Characteristics of Peer-to-Peer Networks

The term peer-to-peer computing refers to a class of applications that allow sharing of computer resources and services by *direct exchange* between systems. Software running at each node is equivalent in functionality. Resources and services of peer-to-peer networks include the exchange of *information*, *processing cycles*, and *disk storage for files*. Decentralization in peer-to-peer systems may apply to algorithms, data, or both of them.

Peer-to-peer systems are often characterized by redundant storage, permanence of data and certain level of anonymity. Various peer-to-peer networks differ mainly in ways of selection of nearby machines, algorithms of searching, authentication methods and style of naming.

In general, peer-to-peer applications allow to:

- share and exchange files between users;
- harness unused CPU time of idle desktop machines;
- use Instant Messaging for efficient communication;
- create user communities based on user's interests;
- take advantage of content stored on peers; and
- take advantage of human presence at the desktop computer.

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