Introduction to Grid Computing (Numerical Analysis and Scientific Computing Series)

by Frédéric Magoulès, Jie Pan, Kiat-An Tan, and Abhinit Kumar

BOCA RATON, FL: CHAPMAN & HALL/CRC, 2009, 334 PP., US$ 79.95,
ISBN: 978-1-4200-7406-2

REVIEWED BY JUHA HAATAJA

Publishing topical books on Information and Communication Technology (ICT) is a tricky business, as they tend to be already out of date when they appear. Luckily, the book *Introduction to Grid Computing* is still mostly relevant as I review it in the spring of 2010, although one can spot signs of impending obsolescence here and there. The book is a compendium describing ICT tools which are used to serve a community of researchers. The term "grid computing" has grown to include a variety of approaches, although there are some common themes. Openness is one of them, referring to both open source software and to the use of interoperable ICT tools to build open services for the researchers involved.

The user communities of grids are referred to as "virtual organizations." The term "virtual" is intended to highlight contrast to the more traditional hierarchy-based organizations. Members of virtual organizations often reside in different countries or institutions that may not have formal cooperation contracts with each other. Grids provide services to widely dispersed groups of users within the virtual organizations. Grid resources are linked together by informal agreements and by joint standards and ICT tools. Of course, it would be easier to constitute a grid within a single organization, but then there would not arise the benefits of collaboration between individuals and groups with different backgrounds brought together by a common interest in a scientific problem.

What is a grid good for? In a typical application, one runs software to perform simulations of a large-scale mathematical model. Grid technology is especially useful when the computation can be divided into distinct pieces that can be run independently on computers which may be geographically wide apart. The "free resources," or the time slots when the owner of the computer is not performing computations, can be shared within the community of grid users. Also, grid technology provides tools for managing, sharing, and accessing data produced by researchers in virtual organizations. The main challenge facing the construction of a grid is the complexity of the necessary ICT. It is a hard task to pool together resources from dozens or hundreds of service providers. It is not a simple matter to make the resources readily available and discoverable for the users, or to exclude unauthorized use such as stealing research data or tampering with it.

The book contains some simple examples of making computations on a grid, such as solving the heat equation with numerical methods. The examples are quite modest and not really useful for real-world computations, but at least they offer a starting point for exploring the use of grids in the computational sciences. It is apparent that grids are still in the construction phase, and many of their features are only available for expert users. You may need to have your own grid specialist willing to help out. Fortunately for the mathematical reader, the terminology of grids is quite well explained. The book ends with a useful glossary.

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