



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SCIENCE @ DIRECT®

Parallel Computing 31 (2005) 797–811

PARALLEL  
COMPUTING

[www.elsevier.com/locate/parco](http://www.elsevier.com/locate/parco)

# Workflow management and resource discovery for an intelligent grid

Han Yu \*, Xin Bai, Dan C. Marinescu

*School of Computer Science, University of Central Florida, Orlando, FL 32816, United States*

Received 31 October 2004; received in revised form 15 March 2005; accepted 15 April 2005

Available online 15 June 2005

---

## Abstract

A computational grid provides coordinated and transparent access to computing resources for grid users. Workflow management and resource discovery are two important functions of an intelligent grid. Workflow management refers to automatic workflow creation and coordinated workflow execution, and resource discovery facilitates resource allocation and claiming. In this paper we discuss workflow management and resource discovery in an intelligent grid environment.

© 2005 Elsevier B.V. All rights reserved.

*Keywords:* Grid computing; Process coordination; Planning; Resource discovery; Matchmaking

---

## 1. Introduction

Data, service, and computational grids, collectively known as information grids, are groups of autonomously connected computers that give individual users the appearance of a single virtual machine [3,6].

---

\* Corresponding author.

*E-mail addresses:* [hyu@cs.ucf.edu](mailto:hyu@cs.ucf.edu) (H. Yu), [xbai@cs.ucf.edu](mailto:xbai@cs.ucf.edu) (X. Bai), [dcm@cs.ucf.edu](mailto:dcm@cs.ucf.edu) (D.C. Marinescu).

A *data grid* allows a community of users to share data. The World Wide Web can be viewed as a data grid that contains numerous HTTP servers providing text, image, audio, and other forms of data resources.

A *service grid* supports applications such as electronic commerce, telemedicine, distance learning, and Business-to-Business. These applications typically require the support from a wide spectrum of end services such as monitoring and tracking, remote control, maintenance and repair, online data analysis and business support, as well as services involving some form of human intervention such as legal, accounting, and financial services.

There are qualitative differences between service and data grids. The data in a service grid is more dynamic and is typically the result of a cooperative effort of various service providers. Therefore, dynamic service cooperation plays an important role in a service grid.

A *computational grid* supports transparent access to computing resources for applications that require substantial CPU cycles, large memories, and massive secondary storage spaces that cannot be provided by a single system.

The requirements placed on the user access layer and societal services are even more stringent for a computational grid than for a service grid. The user access layer must support various programming models and the societal services of a computational grid must be able to handle low-level resource management.

The defining characteristics of a computational grid are: (1) resource sharing among a large amount of grid users; and (2) support for collaborative computing services [5]. In the context of a computational grid, the term *resource* is used in a wider sense and may refer to hardware and software resources, services, and data.

Computational grids inherit many of the traditional distributed computing systems of the past decades but with the following distinguishing characteristics [5]:

- (a) *Large-scale*. A grid may consist of tens of thousands or more computing nodes.
- (b) *Heterogeneity and diversity*. Computing nodes with different processor and system architecture may co-exist in a grid. The communication channels between these nodes may differ in terms of latency and bandwidth. Different nodes may run on different operating systems and support the computation for diverse applications. Various versions of the same application may be available in a grid.
- (c) *Autonomy of individual nodes*. All computing nodes in a grid may belong to different administrative domains with possibly different access, security, and resource management policies.
- (d) *Dynamics and open-endedness*. The status of a grid changes over time. New resources are constantly added to a grid; existing ones are modified; others may be removed temporarily or permanently.
- (f) *Resource contention*. There are a large number of concurrent computations with independent and often conflicting computing objectives and resource requirements in a grid.
- (g) *Complex, resource-intensive tasks*. The computing tasks submitted by grid users may be very complex [7]. The complexity of a task is rather difficult to quantify. It may refer to the number and relationship of component activities, the pre-

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات