Chapter 2
Toward Development of Distance Learning Environment in the Grid

Kuan-Ching Li
Providence University, Taiwan

Yin-Te Tsai
Providence University, Taiwan

Chuan-Ko Tsai
Providence University, Taiwan

ABSTRACT

In recent years, with the rapid development of communication and network technologies, distance learning has been popularized and it became one of the most well-known teaching methods, due to its practicability. Over the Internet, learners are free to access new knowledge without restrictions on time or location. However, current distance learning systems still present restrictions, such as support to interconnection of learning systems available in scalable, open, dynamic, and heterogeneous environments. In this chapter, we introduce a distance learning platform based on grid technology to support learning in distributed environments, where open source and freely available learning systems can share and exchange their learning and training contents. We have envisioned such distance learning platform in heterogeneous environment using grid technology. A prototype is designed and implemented, to demonstrate its effectiveness and friendly interaction between learner and learner resources used.

INTRODUCTION

In recent years, with the rapid development in communication and network technologies, e-learning has been popularized and become one of the most popular teaching methods in educational community. Along with the gradual improvements found in network bandwidth and quality, real-time transmission of high-quality video and audio has become possible and true reality. Because of these major transitions, conventional methods of school education have also followed this trend.

Distance learning utilizes electronic devices to assist the education or training process, taking advantage of the internet or any other communication channel to connect other devices, to deliver information and knowledge. According to Capuano, Gaeta, Laria, Orciuoli, and Ritrovato, (2003), this model of learning has many advantages with respect to traditional models:

- A better interaction between the learners and the learning resources they use, that is, the learning is not passive,
- Learning can happen anytime and anywhere, that is, there are not boundaries tied to time and place,
- Tutors, or learners themselves, are able to monitor the progress and to customize the learning experience basing on learner skills and preferences.

Unfortunately, there are drawbacks related to current learning solutions. First, they are mainly focused on the content delivery. Second, current learning platforms only support a specific learning-domain and are not able to support learning in different domains (Capuano, et al. 2003; Gaeta, Ritrovato, & Salerno, 2003). Third, many e-learning platforms and systems have been developed and commercialized, though, with limitations in scalability, availability, and distribution of computing power as well as storage capabilities (IMS Global Learning Consortium, 2002).

Grid computing has emerged as an important new field, distinguished from conventional distributed computing by focusing on large-scale resource sharing. Grid technology addresses issues related to access provisioning coordinated resource sharing and problem solving in dynamic, multi-institutional virtual organizations (Foster, Kesselman, & Tuecke, 2001).

In distance learning researches, it is a crucial problem the support of existing learning systems in scalable, open, dynamic, and heterogeneous environments. The scenario is a large scale and interconnected computing environment of learning management systems, learning content management systems and virtual classroom systems of different organizations.

Linking the drawbacks presented in learning systems with the advantages grid technology offers, we present in this chapter the design and implementation of a collaborative distance learning architecture based on grid technology in heterogeneous environment. With the combination of grid technology with distance learning, it is possible to build up an effective and ubiquitous learning system with impressive potential, to share learning resources in heterogeneous and geographically distributed environments. Learners can take course of their choice from a distributed virtual content repository and have it delivered to them anytime and any place of their choice in a personalized fashion with support available as and when they need it.

The remainder of this chapter is organized as follows: In the Background section, we introduce generic learning management systems, brief concepts of grid computing and web services. In the next section, it is discussed the proposed architecture for distance learning in the Grid, while following that, the design and implementation of the prototype. Finally, conclusions and future works are presented.

Related Content

Alignment of Course Objectives and Assessment Items: A Case Study
Kenneth Lightfoot and David Schwager (2010). *Cases on Distance Delivery and Learning Outcomes: Emerging Trends and Programs (pp. 97-109).*
www.igi-global.com/chapter/alignment-course-objectives-assessment-items/37997?camid=4v1a

Knowledge Representation in Intelligent Educational Systems
Ioannis Hatzilygeroudis and Jim Prentzas (2008). *Online and Distance Learning: Concepts, Methodologies, Tools, and Applications (pp. 1888-1902).*
www.igi-global.com/chapter/knowledge-representation-intelligent-educational-systems/27516?camid=4v1a

A Collaborative Augmented Campus Based on Location-Aware Mobile Technology
A. De Lucia, R. Francese, I. Passero and G. Tortora (2012). *International Journal of Distance Education Technologies (pp. 55-73).*
www.igi-global.com/article/collaborative-augmented-campus-based-location/62288?camid=4v1a

Online or Traditional: A Study to Examine Course Characteristics Contributing to Students' Preference for Classroom Settings
Tim Klaus and Chuleeporn Changchit (2009). *International Journal of Information and Communication Technology Education (pp. 14-23).*
www.igi-global.com/article/online-traditional-study-examine-course/3982?camid=4v1a