

Chapter 82

Grid Technology for Archive Solutions in Health Care Organizations

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ABSTRACT

The main aim of this chapter is to evaluate a Grid technology (GT) for Archive Solutions in terms of relevant features for Health Care Organizations (HCOs), and with particular attention to technical and organizational issues. The method used was a case study approach that was conducted during the months of March, April, and May 2011, applying a mix of random sampling (randomly selected interviewees from our directory) and “snowball” sampling (contacting interviewees through leads). The research shows that the introduction of grid technologies in HCOs maybe is still premature. However, a grid solution unquestionably led to some important benefits, so the author suggests a “progressive and gradual approach” to its implementation, aiming for further research on this topic.

INTRODUCTION

Healthcare providers must manage a large volume of film images and documents to support efficient diagnosis for radiology, cardiology, pathology, and other disciplines. To address this issue, many providers have digitized files and have chosen to manage them, using Picture Archiving and Communication Systems (PACS). While digitization provides valuable information for clinicians, it also poses significant challenges for IT managers, due to the tremendous amount of necessary storage capacity. This creates the need to improve the

scalability, reliability, and resiliency of a hospital’s information storage infrastructure.

Since PACS generally serve individual departments or hospitals, current storage systems normally have limited means to link together records or storage resources across multiple campuses or remote facilities. In addition, there is the problem of managing heterogeneous PACS platforms across different healthcare enterprises. Moreover, PACS solutions, as they are currently implemented, stress the importance of an optimized level of service in a local network, which leads to having “siloeed” storage solutions with a high level of redundancy,

but no overarching provision for integrity of the data and business continuity. The GT allows multi-campus hospitals and imaging centers to link together geographically disparate sites and modalities, helping to optimize storage utilization and eliminate redundancy. GT creates a “virtual” medical imaging archive, linking several PACS solutions and keeping multiple copies of images in geographically distributed sites, eliminating the need of a physical disaster recovery site.

This solution allows the entire enterprise storage infrastructure to be centrally managed like a single storage network; moreover, it is demand-oriented: users send requests to the software, which allocates them to the most appropriate resources for processing. This way the availability of patient images from all disciplines throughout the extended organization is guaranteed.

Moreover, this architecture enables a logical separation of PACS and clinical applications from the storage infrastructure and offers an adaptive, self-managed operating environment to improve data accessibility and reliability. It provides an optimized archival of images and guarantees real-time business continuity and disaster recovery. As far as security is concerned, the software ensures data integrity with digital signatures. The interoperability and easy integration of this solution makes it a compelling solution for multivendor environments that characterize today’s healthcare enterprises.

The layer above the IT resources handles functions such as security, workflow, databases, file systems, directories, and messaging software. These are typically implemented as general-purpose middleware components. This middleware generally exploits the lower layer of physical resources and provides functions that can be abstracted and “virtualized” as services.

Hence, the objectives of this chapter are to evaluate a Grid technology (GT) for Archive Solution in terms of relevant technical and organizational features for Health Care Organizations (HCOs), focusing on its use and implementation.

BACKGROUND

According to the grid computing literature, grid adoption depends on the ability of technology to deliver increased business value. The business issues, related to the grid adoption model, include key factors (Joseph et al., 2004; Pacitti, 2007), such as leveraging existing hardware investments and resources; reducing operational expenses; creating a scalable and flexible infrastructure (Jensen et al., 2005); accelerating development time; improving time to market, and increasing customer satisfaction and business productivity in the field of scientific computing (Jimenez-Peris et al., 2007).

The major factors that influence grid adoption in healthcare enterprises (Montagnat, 2004; Glatard et al., 2006; Previtali & Bof, 2007) are the following:

- Increased requirements in terms of value from the IT investment;
- Maturation of grid standards;
- Expanded impact of grid technology (Finkelstein, 2004);
- Increased confidence in grid technology/capabilities;
- Opportunity to involve business process improvements, as part of the increasing value from IT investment;
- Convergence of Web services standardization and grid standardization;
- Need for direct interactions/transactions with customers, suppliers and partners;
- Need for customers/suppliers and internal staff to work with the same data.

If we turn our attention to patient safety issues, we can outline the following benefits (Foster, 2001; Frost & Sullivan whitepaper, 2006):

- Enables business continuity with a fully redundant, self-healing archive;

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