

Chapter 17

e-Infrastructures for Cultural Heritage Applications

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ABSTRACT

e-Infrastructures, made of high-speed networks and geographically distributed multi-domain computing and storage resources, are nowadays supporting many virtual research communities from various scientific disciplines all over the world, allowing their applications to run at a scale of complexity which

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allows unprecedented studies of very important multi/inter-disciplinary problems. In this chapter the authors show how such platforms can also be beneficial for arts, humanities and cultural heritage at large. Some exemplary hardware infrastructures, middleware services, and software applications will be shown, in order to provide the readers with updated information on the state of the art approaches.

INTRODUCTION

Since the onset of the 21st Century, the way scientific research is carried out in many parts of the world is rapidly evolving to what is nowadays called e-Science, i.e. a “scientific method” which foresees the adoption of cutting-edge digital platforms known as e-Infrastructures throughout the process from the idea to the production of the scientific result. The e-Science vision is depicted in Figure 1.

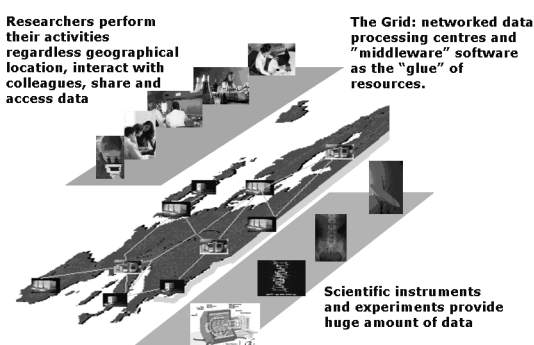
Scientific instruments are becoming increasingly complex, and produce massive amounts of data which are in the order of a large fraction of the whole quantity of information produced by all human beings through all means. These data often relate to inter/multi-disciplinary analyses and have to be studied by ever-increasing communities of scientists and researchers, called Virtual Organisations (VOs), whose members are distributed all over the world, and belong to different geographical, administrative, scientific, and cultural domains. The computing model which is emerging as a “de facto” standard to turn the above vision into reality is the so-called “Grid”,

i.e. a large number of computing and storage devices, interconnected by very high-bandwidth networks, on which a special software called middleware (acting as an interface between the hardware and the operating system and the codes of the applications) is installed, and make them behave as a single distributed supercomputer. Such virtual computing facility “dissolves” in the fabric of the Internet and can be accessed ubiquitously through virtual services and high-level user interfaces.

In this chapter, we will discuss e-Infrastructures and general purpose middleware services to create and operate digital repositories. The description of some exemplar use cases will help demonstrating the benefits their exploitation can bring to Arts, Humanities, and Cultural Heritage at large.

The chapter is organized as follows. Next section “e-Infrastructures and Their Services” will provide the definition and some declinations of the concept of e-Infrastructure. General purpose middleware services for high level user access, data management, and digital repositories’ creation and maintenance will be described in sections going from “The GENIUS Portal: a Grid Gateway for e-Science” to “The Transactional Grid Storage Access Framework”. Some success use cases, belonging to the Cultural Heritage domain, will be presented in sections going from “The ASTRA Project” to “The ArchaeoGRID Project”. Conclusions will then be drawn at the end of the chapter.

Figure 1. The “vision” of e-Science



E-INFRASTRUCTURES AND THEIR SERVICES

The grid and the underlying network constitute together what it is commonly referred to as an e-Infrastructure (see Figure 2).

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