Chapter 10
The ASTRA (Ancient instruments Sound/Timbre Reconstruction Application) Project brings history to life!

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Abstract

ASTRA (Ancient instruments Sound/Timbre Reconstruction Application) is a project coordinated at Conservatory of Music of Parma which aims to bring history to life. Ancient musical instruments can now be heard for the first time in hundreds of years, thanks to the successful synergy between art/humanities and science. The Epigonion, an instrument of the past, has been digitally recreated using gLite, an advanced middleware developed in the context of the EGEE project and research networks such as GÉANT2 in Europe and EUMEDCONNECT2 in the Mediterranean region. GÉANT2 and EUMEDCONNECT2, by connecting enormous and heterogeneous computing resources, provided the needed infrastructures to speed up the overall computation time and enable the computer-intensive modeling of musical sounds. This paper summarizes the most recent outcomes of the project underlining how the Grid aspect of the computation can support the Cultural Heritage community.

Keywords: Grid Computing, Music, Art, Ancient instruments reconstruction, the ASTRA Project.
1. Introduction

The ASTRA [1] project is very much a multi-disciplinary effort, involving not just computer scientists and musicians, but also historians, physicists, archaeologists, and engineers. The overall goal of the project is to reconstruct the sound or timbre of ancient instruments (not existing anymore) using archaeological data as fragments from excavations, written descriptions, and pictures on ancient urns. Since we are talking about instruments of centuries B.C. we can understand why the ASTRA slogan is “to bring history to life”. So far, ASTRA effort was focused in the reconstruction of the sound of plucked ancient string instruments. The history of the plucked string instruments arose 6 millennia ago in Mesopotamia, where the instruments were built by limited technical skills, craftsmanship, and material knowledge of the ancient times. In the course of history, plucked string instruments were first constructed by joining natural environmental objects such as wooden sticks, gourds, and turtle shells, and later, gradually, by manufacturing selected, processed, and specifically designed parts. The work performed by ASTRA to address this ambitious goal is sketched in fig.1

![Figure 1 Modelling and computation of ancient instruments in Grid.](image)

Starting for all archaeological findings about the instrument such as: fragments from excavations, written descriptions, pictures on ancient urns and so on, ASTRA creates a computing model of the instrument. The Physical Modeling Synthesis [2] is the advanced digital audio rendering technique adopted by ASTRA. Afterwards, this computing model is simulated as a mechanical system in order to produce as output the sound of the instru-