Apa the Etruscan and 2700 years of 3D Bologna History

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1 Introduction

In the new Bologna City Museum (`http://www.genusbononiae.it`), in an immersion room ready for 3D stereo movies designed ad hoc by Cineca (`http://www.cineca.it`), the public will encounter a unique experience halfway through their visit: a journey through time, a sort of Big Bang of Bolognese history, 2700 years in just 14 minutes. This visit will be led by a friendly 3D character: the Etruscan APA, whose name means "father". Lucio Dalla, a popular Bolognese singer, actor and director, provides his voice. It is the first 3D Blender-made stereo movie with high historical standards applied to an entire city with four different geo-referenced scenarios and six historical periods: Etruscan, Roman, Renaissance, XVII and XVIII century and the present day. The methodology developed for this realization, focused on open source and an inter-disciplinary framework, has been of great help in this endeavour and will be the main point of this presentation.

2 Movie concept and open Blender pipeline

The first step in the creation of the short movie was the definition of a visual concept, inspired by Ratatouille's Paris (Pixar, 2007). The second fundamental step was the definition of a main character capable of leading the audience through more than 2,000 years of history in a very short time, merging friendliness and historical reliability. From a relief on a bronze Etruscan vase from the 7th century b.C., the silhouette of a musician was chosen as the starting point for giving life to APA, our storyteller.

The project's strong interdisciplinary nature required the collaboration of different teams with different professional skills. We decided to use a repository for versioned storage for most of the data involved in the workflow. The repository engine (SVN) has been installed within the HPC cluster so as to allow rendering jobs to be data-driven by the evolving content. Most of the interactive tools (Blender, Meshlab, Cityengine) were installed on Remote Visualization nodes to allow remote interactive handling of large data models requiring large memory and fast CPUs.

The traditional 3D Blender production pipeline has been widened with specific features and constraints, enabling a philological approach, to be integrated within the creative process.

The scenarios that bring the visitors through different ages have been modeled starting from strict archaeological and historical studies relying on a variety of scientific data: such as GIS data, laser scanned data, landscape reconstruction and three-dimensional models coming from previous research projects.

The software used to manage all this data was open, such as Qgis and Grass for GIS data, MeshLab for laser scanner data and Blender for modelling new scenarios and the reuse of existing models. City Engine was the only licensed software used for the present day, Medieval, Roman and Etruscan procedural modelling of Bologna.

The files exported from City Engine were in the OBJ file format - containing geometry, texture and texture mapping - hence, all the procedural work could be imported inside Blender. An important tool was also the Python Language used in all the different parts of the pipeline in order to speed up and automate all this complex work (i.e. several scripts were created for Blender to organize and verify models and textures; a useful script was also made to import the GIS data inside City Engine). Whenever possible, an open source approach was followed to ensure a future use of the models and to allow the creation of scripts to better manage and control data and processes.

Then, the resulting scenarios were used by the character animators, the lighting technicians and the director to compose all the scenes in terms of camera movement, character animation rigging and finalization before rendering.

The 3D HD has been rendered on the Cineca Blender Render Farm, which differs from normal Blender rendering farms, since it runs on a Cineca HPC cluster, where jobs must be submitted through a job scheduler; so we created a series of scripts that use the batch mode of Blender, splitting the frames to render among the CPUs that have been asked. Blender has been compiled with the Intel compiler for a better performance (about 25% faster).

3 A project as a training opportunity and an open content resource for future use

The realization of this short movie (3D DCP2K format, developed by a team of 20 over a two-year period), was conceived as a stepping stone for further projects. It cost around 16.000 per minute due to the opportunity of adapting the work done during previous projects, and the contribution of several interns, who utilised this project as a training opportunity. The blog became a Content Management System for movie-produced media, such as making-of videos, reports, tutorials, and instruments used for both the internal transfer of knowledge and material of interest for the open source community. The open content produced within this stereoscopic movie will be reused in upcoming projects for various platforms, such as mobile and 3D digital TV programs, as well as applications developed by other museums.