National Grid NG SINGAPORE

Digital Media Applications on the Grid

Project Introduction

Objectives
To develop a Rendering-on-Demand application for the utility Grid and a Grid-enabled function-based collaborative 3D shape modelling application.

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Period of Project
01 Dec 2004 – 30 Nov 2006

Abstract
The rendering of digital animation sequences and of high resolution digital images are very compute-intensive. This project endeavours to harness the powerful resources of the Grid to provide access to speedy rendering of 3D animation and interactive shaping of 3D models.

Project Details

Description
This project leverages the power of Grid Computing to provide animators and artists with a solution for:
(a) fast rendering of digital animation sequences and
(b) interactive modelling of complex geometric 3D shapes.

(a) Rendering of a 3D animated sequence or feature film is a very time consuming task since it involves processing the thousands of frames that are needed to create an animation. The resources of a Computing Grid is harnessed to provide a solution for animators to handle these tasks.

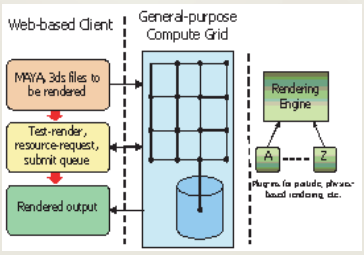

Figure 1. The general framework of a Grid rendering system

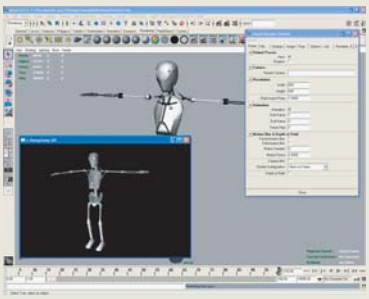

Figure 2. The GUI plug-in to Maya 3D provides rendering on-demand. A single frame of the robot animation sequence is shown

Our rendering framework establishes a system that is able to share rendering resources among users accessing the facility through high speed LANs, WANs and over the Internet.

Animators submit, on-demand, the time-consuming rendering job to the Grid interactively through a portal or through the GUI plug-in within the 3D modelling tools.

The rendered images can be either downloaded from the remote server at a later time or are sent back to the animator upon completion.

b) Geometric shape modelling becomes an increasingly complex and resource-demanding task. Function-based representation allows for defining shapes with sufficient detail in a very compact manner.

The design of the system includes a general framework for distributing workload among Grid nodes under real-time interactivity constraints. The goal is to allow many users to create shapes with free-from modifications in a collaborative manner. This provides many advantages such as instant feedback from the clients, more efficient workflow and overall reduced time-to market.

The standalone function-based modelling application shown in Figure 3 allows for free-form modifications, but as the object becomes more complex, one computer ceases to be sufficient to perform interactive modifications of the shape in a timely manner. We have designed and currently are implementing parallel modelling algorithm capable of interactive modifications even when the model becomes very complex. Figure 4 shows an intermediate stage of remote parallel rendering as it is processed.

Figure 3. Original standalone application through the browser

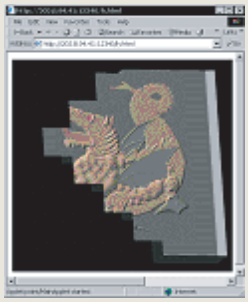

Figure 4. Grid-based rendering in progress browser