



UNI-VERSE

Sascha Schneider, Marcus Hoffmann

Introduction

Within the UNI-VERSE project an open source Internet platform for multi-user, interactive, distributed, high-quality 3D graphics and audio for home, public, and personal use is created. The different platform components support high-quality 3D graphics as well as high-quality 3D audio and acoustic simulation.

The foundation of the platform is »Verse«, a lightweight, low latency, general-purpose network protocol for 3D data, which lets multiple applications act together as one large system by sharing data over the network. If one application makes a change to the data the change is distributed instantly to all interested clients. Therefore rendering engines,

tools, simulation engines and other components can be separate applications working together over a network to form one large application.

Such a platform is of great interest for the interactive media industry as well as for design, arts, education, and simulation.

Objectives

The main purpose of the project is to create an open source IP-based platform for distributed multi-user multi application scenarios. The aim of the project is to unify the technology found in virtual reality, games, and networking to create a delivery platform for a new form of content. If this technology becomes a de facto standard it would be possible to

German Abstract

UNI-VERSE ist ein von der Europäischen Kommission gefördertes Grundlagen Forschungsprojekt. Innerhalb dieses Projektes wurde eine Softwareplattform realisiert, in der kooperatives Arbeiten an 3D Audio- und Geometriedaten über das Netzwerk, Betriebssysteme und sogar verschiedene Programme hinweg möglich wird. Das Netzwerkprotokoll Verse, das im Rahmen der Forschungen weiterentwickelt wird, liefert hierzu die Basis. Realisiert werden verschiedene Anwendungen, vom verteilten akustischen Rendering bis hin zur simultanen kooperativen Konstruktion von 3D Modellen in unterschiedlichen CAD Programmen und letztendlich der Visualisierung auf verschiedenen Endgeräten wie einem PDA, dem PC oder der Heyewall.



Figure 1: Sharing the same 3D scene dataset on a PC and on a PDA



Figure 2: The UNI-VERSE network: Several applications share the same dataset

source but other companies may develop modules for UNI-VERSE, which are proprietary.

For the development and implementation of the individual project work packages several further participants are responsible. Some of them are end-users and some are the developers who implement the corresponding parts of the system. These partners are in detail:

- Kungliga Tekniska Högskolan (Sweden)
- Interactive Institute (Sweden)
- Helsinki University of Technology (Finland)
- Minusplus Architects (Hungary)
- Paregos Design (Sweden)
- Blender Foundation (Netherlands)

<http://www.uni-verse.org>

Point of Contact

Dr.-Ing. Jörn Kohlhammer
 Fraunhofer IGD, Darmstadt, Germany
 E-mail: joern.kohlhammer@igd.fraunhofer.de

build up development pipelines, tools and education that would increase overall quality and experience, drastically reduce the development cost of content and open up a wide range of applications. The network structure available today makes this approach possible. This UNI-VERSE platform is »open« to allow any content provider to add content, any hardware vendor to create new hardware, and any tool/technology vendor to develop software.

Description

The basis of the UNI-VERSE platform is an IP network protocol for integrated dynamic 3D graphics and 3D audio content. This lightweight, low latency network protocol is based on an existing protocol known as »Verse«. It has already been developed in a first version beforehand by one of the partners. In the project context it is heavily extended (e.g. with 3D audio data streaming) to let

multiple components act together as one large application by sharing data over the network. If one application makes a change to the data the change is distributed instantly to all interested clients. This simple network protocol allows anyone to write components and applications that are compatible. The protocol is usually configured with a central server that acts as a hub passing the messages to the clients. Clients no longer need to access data through load/save features since all communication is done instantly using the protocol. This also adds redundancy since all clients and the server have a copy of the data. No data is lost if one component crashes. The data format used by the protocol is an easy-to-use, non application-specific format, but with advanced features like for example subdivision surfaces geometry, shader trees, high dynamic range and 3D textures. All software developed in the project will be open