DaMI – Data Management for Multimedial Information Systems

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DaMI - Data Management for Multimedial Information Systems

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ABSTRACT

This paper describes a Data Management System for Multimedial Information Visualization called **DaMI**. It is possible to create 2D or 3D model based on data out of standard databases and additional metainformation. **DaMI** is a generic system guaranteeing an optimal reusability and compatibility.

CR Categories: K.6.1 [Management of Computing and Information Systems]: Project and People Management—Life Cycle;

Keywords: data management, visualization, virtual environments

1 INTRODUCTION

The application domain environmental planing and urban development is a very challenging application area for information visualization. A large amount of data needs to be organized because very different data types do exist. It is necessary to develop generic data structures and a flexible system. Our **DaMI** system is platform independent and offers as much reusability as possible.

2 STATE OF THE ART

Virtual environments and augmented reality simulations are of growing importance in many application areas. These techniques provide opportunities to visualize various steps of planning processes to test the quality "online" and to offer immediate feedback.

The presented framework is a different approach to virtual reality and web based visualizations. The existing systems established on the market are "relatively static" (see [4]). In general they can only be used in one application field. Our system is dynamic and generic, it allows the analysis and the documentation of various levels by adjusting certain parameters.

3 DAMI

The **DaMI** system is based on the "component based framework for integration of visualization techniques", which was presented in [1], [2], [3] and is now a standard method. It offers generic data structures for integration into the visualization pipeline. Based on this component technology we can separate data and functionality. Therefore it is possible to share data structures in certain application areas but not their functionalities. This is the key to the flexibility of our system.

3.1 Framework

The **DaMI** system is build on a component based client-server-architecture. The current surface of the client is the user interface to communicate with the server. The surface is divided into three parts. (Figure 1).

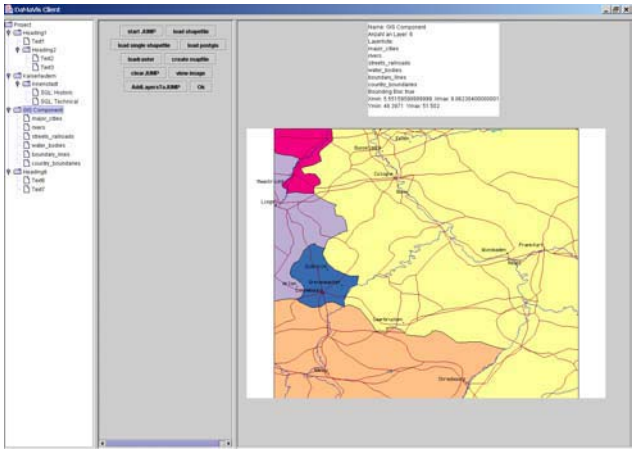

Figure 1: **DaMI** client with map of state of "Rheinland-Pfalz"

The left side shows the structure of the actual project. The tree structure is presented to the user. The tree allows pasting or deleting all the objects as needed. For example, it is possible to discard different headlines, texture or description of layers. The description of the layer is represented as a so called GIS component. The user can add different layers of databases or shape files to the GIS component.

We use the open source database software PostgreSQL to save GIS data. The package PostGIS (built upon PostgreSQL) offers the opportunity to store additional geometric data formats. The representation of the geometric data is compatible to the standards of the open GIS consortium (OGC).

The center of the user interface shows the selected component of the tree and its configuration opportunities. The right side of the user interface displays information about the selected component of the tree. Some components offer small previews in addition.

The central part of the **DaMI** system is the **DaMI** server, which has to cope with a lot of different tasks. The server handles all the users of the system. It searches for the required data, which is stored in databases or on the fileserver. The MapServer is completely integrated as part of the server. It is used to generate a map out of the

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GIS component, which can be presented afterwards on the client using current formats.

The communication between **DaMI** server and clients is done by the middleware CORBA to guarantee the location- and platform independent communication of all the components of the **DaMI** system.

The structure tree of the actual project can be loaded and stored using the data standard XML.

3.2 2D Application: GIS report

Based on GIS data a report including a map ought to be produced. First the user starts the **DaMI** client and selects a GIS component in the tree. Then the GIS data will be checked out of the database and this part of the tree is presented on the client via configuration panels. The displayed GIS data is taken over by the GIS component, after all necessary adjustments are done. Next this GIS component is transferred by CORBA to the **DaMI** server to be analyzed and stored. The GIS component is evaluated on the server by an information conversion into a mapfile. The mapfile is a configuration tool of the map server and influences the appearance of the generated map. That mapfile and the GIS data (out of the database) generate the desired map. It is important to keep in mind that GIS data is not transferred between client and server, it is stored during the whole process in the database. Only the information about the location where the file is stored and the appearance of the GIS data is transferred.

3.3 3D Application: City of Kaiserslautern

Some parts of the city of Kaiserslautern are supposed to be integrated in the 3D model. The digital reconstruction of every building can be compared to the manufacturing of a new car. The product lifecycle management (PLM) system creates every reconstruction. A multimedia system based on 3D geometry will be developed in conjunction with additional information like video, text or audio. (Figure 2)

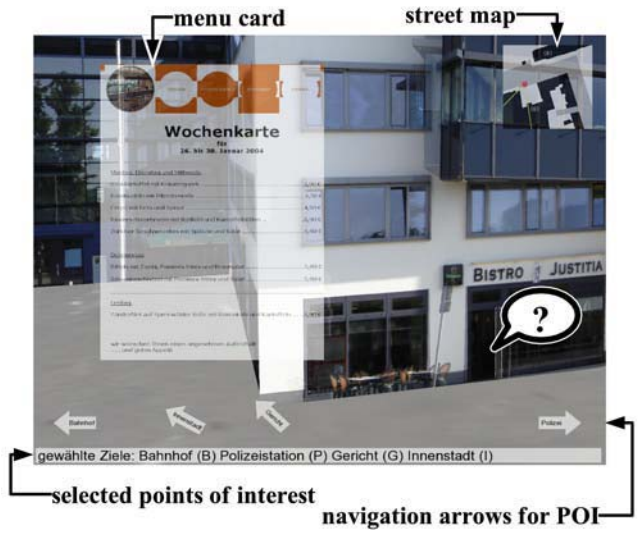

Figure 2: Example: Acquisition of information about "Bistro Justitia"

The use of a framework datastructure for data management distinguishes our system from other presentation systems. The generic data structure of our system allows to use different output media. Thus, once created models can be preprocessed for several output media and updated with additional data.

The process of creating such an information system can be seen as a multi-stage process. In the beginning there are three dimensional models, which can be created by any program (CAD, animation software). These models establish the groundwork and are stored in the data structure as a complete model. So it is possible to group several functional entities hierachically. For each component or functional entity several keywords can be stored in further steps. With these keywords more data of the database can be assigned. The user is now able to induce the system to search for information from different sources and put these data in a sorted way in the data structure. Instead of creating a copy of each data item in the data structure only a reference to each source is created. Therefore it is obvious to the user when sources are changing. An update mechanism ensures that the data is updated.

The open architecture and the choice of the output media allows this system to be easily adopted to planning, presentation, and inspection. Metadata can be merged with a project structure and preprocessed.

4 Future Work

The presented system could be extended in the future by an automatic classification mechanism for documents. Existing documents could be parsed and classified to different subject areas by the system, e.g. by searching for keywords. For example, it would be possible to recognize the data of a technical document und assign them automatically.

The ability of the system to deal with popular 2D/3D data formats for presentations with different presentation systems (Haptik-Device, Powerwall) is another possible extension.

References

[1] M. Műnchhofen; I. Scheler; K. Hergenroether; H. Hagen and G. Weber:. A distributed component-based framework for visualizations in virtual environments;. In *International Symposium on Mixed Reality (ISMR)*, 2001.

[2] M. Műnchhofen; I. Scheler; K. Hergenroether; and H. Hagen:. Diversified visualisation from www to vr;. In *International Symposium on Virtual and Augmented Architecture, Dublin*, 2001.

[3] M. Műnchhofen; I. Scheler and H. Hagen:. A framework for information visualization;. In *CODATA Workshop, Paris*, 2002.

[4] O. Stock and M. Zancanaro:. Intelligent interactive information presentation for cultural tourism;. In *Workshop on Natural, Intelligent and Effective Interaction in Multimodal Dialogue Systems, Copenhagen*, 2002.