



# Internet Archive for Electronic Music

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## 1 Introduction

The Internet Archive for Electronic Music (IAEM) is intended to be a platform for students and others to access an extensive archive of electronic music. The system differs from a normal music library because it offers a number of extended capabilities. It combines collaborative tools, real-time room simulation techniques and the content of the archive to a powerful teaching and researching tool.

Collaborative tools allow users to exchange knowledge and experiences. Mailing lists, discussion forums and electronic bulletin boards provide the basis for information exchange among users. Personalised access allows one to subscribe to discussions or news about a work of interest. Student working groups can be formed easily so that the system can be used as a teaching facility. To provide music content on the Internet demands a restricting access scheme. The IAEM includes a LDAP based authorisation and enjoys terms of use on different user groups to ensure the legal certainty. This accurate user tracking also makes it possible to make the platform a place where user can publish their own work.

To include real-time room simulation into a library system is a new concept. The increasing processing power of customary PCs makes it possible to compute real-time signal processing tasks without the need of special DSP devices. IAEM provides a client based room simulation which allows the user to perceive the music in an adjustable virtual environment. This enables the user to listen to multi-channel music historically and acoustically in the right context.

The following section provides the proposed structure of the IAEM system including some details about the components.

## 2 Structure

The IAEM structure basically consists of three levels:

- 1) The databases which contain the digitised music data.
- 2) The Internet portal providing the collaborative tools, access to the music data and which manages the authentication.
- 3) The client application is a browser with a special plugin to handle the room simulation.

Figure 1 illustrates the approach.

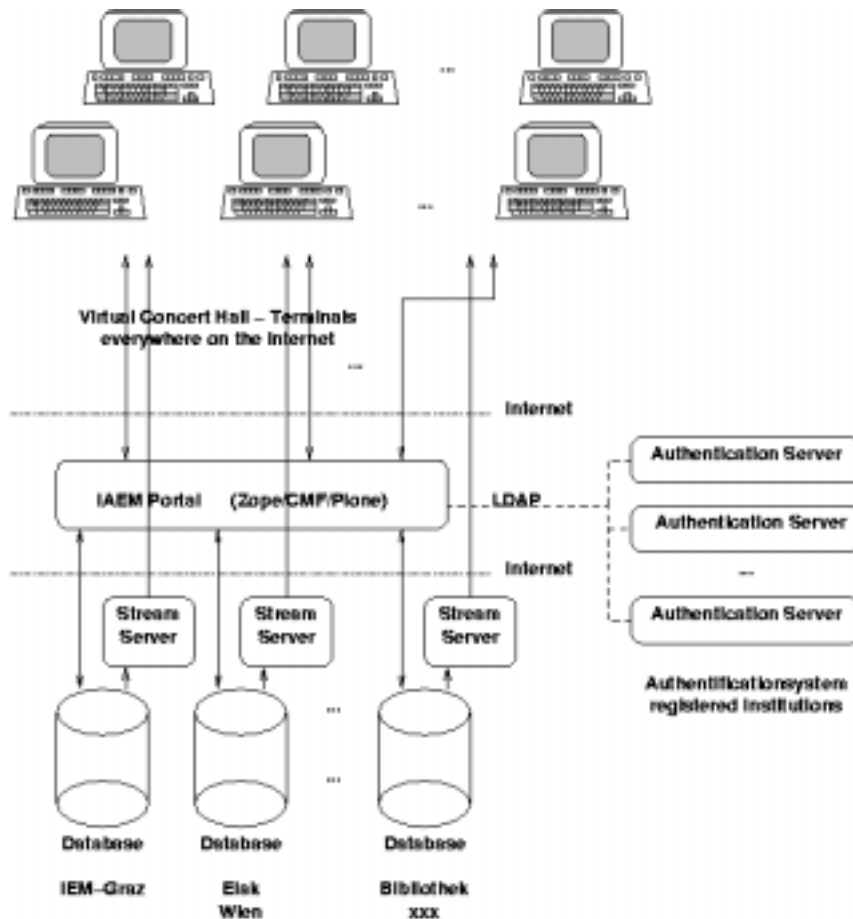


Figure 1: Basic structure of the IAEM including client terminals

The distributed databases allow an extendable system, eases the integration of already existing data and improves the availability of the service. The databases are set up, filled and maintained by different organisations. Common interface standards to the Internet portal guarantee the interconnectivity. This interfaces need to handle any kind of queries and manage the connection of the client to the streaming server. In order to distribute the data traffic, clients are connected to the databases directly to receive the audio data and are not routed via the portal. Nevertheless, the portal is responsible for setting up the connection, for making it secure against intrusion and ensuring the peer-authenticity.

Besides the tasks mentioned above, the Internet portal provides collaborative tools and additional information about the music pieces. A separate database indexes the content of all music archives and stores any additional information. It also keeps track of comments, discussions and every other user output in reference to the works. The needed functionality of this portal is available from free software projects like Zope, Plone or CMF. The IAEM is proposed to work with the Zope server software.

The real-time audio rendering is done at the client side. This offers a number of advantages: No central rendering processor of high performance is needed. The system's capacity is only restricted by the bandwidth to the streaming servers. Additionally, the architecture is very flexible. Changes in the set up of the virtual environment can be introduced without waiting for the server to process the new conditions. A wide range of different simulation algorithms can be offered. The client application provides an interface where patches can be applied and the behaviour of the simulation can be altered. The DSP simulation programme Pd (Pure data by Miller Puckette, <http://crca.ucsd.edu/~msp/>) is used in a browser plugin version to apply

the signal processing. The simulation method is given by the calculation rules and might be altered by downloading a patch. The simulation parameters are provided by the graphical interface of the plugin. It offers suitable data fields (e.g. sliders) to adjust the parameters and a graphical representation of the virtual environment. The acoustical representation of the database content may also vary. It is conceivable to provide patches to produce binaural output for headphones as well as output to drive Ambisonic loudspeaker arrays. Additional feedback devices like headtrackers can also be introduced easily.

The result is a highly scaleable sound reproduction system connected to a library like music archive with additional features to simplify information exchange between users.

Collaboration with

- Universitätsbibliothek der KUG
- Universität für Musik und darstellende Kunst Wien