

AN OBJECT ORIENTED APPROACH FOR COMPUTER INTEGRATED BUILDING (CIB) MODELLING USING JAVA

Eduardo Zavalla, Marcelo Martin

*Instituto de Automática (INAUT)
Facultad de Ingeniería
Universidad Nacional de San Juan
ezavalla@inaut.unsj.edu.ar*

ABSTRACT

This paper presents an object-oriented design and implementation of a software module to be used as the monitoring application for a Computer Integrated Building (CIB) in an intranet/extranet context.

Description of the system

In order to introduce the problem, an overview of the entire supervisory system is given. This system has been designed based on the three-tier client-server paradigm with added Internet-like capabilities, namely, a Web server.

- The server side is composed by a cluster of custom TCP/IP servers, each one taking care of different tasks. The idea behind this proposal is that every service in the building can be modelled by a server process who gathers the information about that service and makes it available over a LAN, perhaps after pre-processing it.
- The client side is a multi-platform application which shows schemes and components of the building and actively updates their status. The user can request detailed views of either schemes or devices, even live images from remote cameras.
- Finally, the middle-tier application is a proxy-server process running on the same host as the Web server does. This proxy server binds the client side with the server side and provides a basic security mechanism based on host recognition and data encryption.

Client application

The client application was developed by mapping building's physical components to software entities and considering not only their properties but also their behaviour. This behaviour is intrinsically concurrent, so, it is necessary to apply concurrent programming techniques to reflect this fact.

Even when it is not related to the building structure, communications between clients and servers must be also modelled because software objects status must closely track the status of their physical peers in the building, as reported by the corresponding server. Thus, the communication link is a key concern to consider.

In this way, the object-oriented paradigm was chosen as the design technology. Java was the selected language for this implementation because it is a naturally object-oriented, platform independent language, with full network communications and concurrence support. Additionally, Java allows an application to be loaded from a Web server, enabling the remote supervision of the building if a Java-enabled HTML browser is available.

This paper proposes several classes hierarchies developed for this application, which were built accomplishing with the premises stated above. Concurrent programming, TCP/IP communications and multilingual support are also analysed.

Finally, a comparison between developed software objects and the *domots* concept, as well as some results about the current implementation are presented.

Keywords: Computer Integrated Buildings, Object-oriented design, Java, Intranet/extranet