Logical Foundations for Data Integration

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Integrating heterogeneous data sources, which are distributed over highly dynamic computer networks, is one of the crucial challenges at the current evolutionary stage of Information Technology infrastructures. Large enterprises, business organizations, e-government systems, and, in short, any kind of internetworking community, need today an integrated and virtualized access to distributed information resources, which grow in number, kind, and complexity.

Several papers published in the last decades point out the need for a formal approach to data integration. Most of them, however, refer to an architecture based on a global schema and a set of sources. The sources contain the real data, while the global schema provides a reconciled, integrated, and virtual view of the underlying sources. As observed in several contexts, this centralized architecture is not the best choice for supporting data integration, cooperation and coordination in highly dynamic computer networks. A more appealing architecture is the one based on peer-to-peer systems. In these systems every peer acts as both client and server, and provides part of the overall information available from a distributed environment, without relying on a single global view.

In this talk, we review the work done for rigorously defining centralized data integration systems, and then we focus on peer-to-peer data integration, with the aim of singling out the principles that should form the basis for data integration in this architecture. Particular emphasis is given to the problem of assigning formal semantics to peer-to-peer data integration systems. We discuss two different methods for defining such a semantics, and we compare them with respect to the above mentioned principles.

References


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