Re-thinking the Data Model: GIS as/is a Relational Database

N.W.J. Hazelton† and Y. Wu

Department of Geospatial Informatics,
Troy University,
Troy, AL, 36082.

Email: nhazelton@troy.edu

† Corresponding Author

Abstract

GIS application software matches spatial data very well with relational database technology for storing attribute data, even if a relational database is not used for storing the spatial components of the data. Early efforts to use a relational database as the foundational storage system for GIS ran into serious performance issues or used databases that were not fully relational (e.g., Empress for the System 9 GIS). More recent systems use extended relational databases as a storage system, in effect acting as a flat-file system of links to external files, but the spatial data component is handled by other software in a non-relational way.

Yet the fundamental nature of GIS, whether raster or vector in nature, satisfies relational logic. GIS operations cannot proceed unless the GIS's spatial data has been normalized to at least the Third Normal Form. This normalization is apparently unconnected with relational logic and today is largely hidden from the user.

In this paper, the authors explore how GIS is essentially relational in nature, laying out the critical importance of spatial data normalization.