

Metadata Information Systems For Digital and Analog Spatial Data

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The growth of large data repositories and libraries for spatial data within many organizations demands for efficient metadata information systems (MDIS). Research on metadata had a large momentum in the last few years yielding several standards and prototype systems. However, there are not yet many operational systems running and current standards are not yet adopted frequently.

MDIS usually are used in two different environments, although both of them might be appropriate in some cases. They are either used for internal control of large data repositories, both to administrate existing data and to keep track of ongoing and new data collections. Or, the MDIS is primarily used as a directory for existing data sets, for example in libraries, possibly pointing to other sources physically storing the data.

This paper discusses several issues concerning MDIS. In the first part it presents some theoretical considerations as well as an overview of some major operational MDIS (e.g., NASA master directory, USGS Global Land Information System) and planned systems as well. The spatial component is usually treated in the same way as the other attributes of the metadata, i.e. there are not many spatial query features. This is appropriate for MDIS that are primarily used for external access, i.e. as directory services. Spatial queries are nonetheless important for MDIS that are used in combination with large GIS installations, in order to keep track of data sets available, their lineage and other metadata.

A second part deals with the recently accepted U.S. standard for the content of spatial metadata (FGDC Content Standards for Digital Geospatial Metadata) and other related and ongoing initiatives for setting up MDIS in conjunction with issues of world wide communication, e.g. GeoWEB-projects.

The last and central part compares three different software architectures for the implementation of MDIS and in particular the metadata storage: File systems, relational data base systems (RDBMS) and object-oriented data base systems (OODBMS). The tree-based structure of metadata as it is defined with the FGDC standard can be mapped in several different ways into a suitable digital representation. Unlike other information documented within a MDIS, spatial data sets tend to have quite large documentation, or at least, should have large documentations. The size of the various metadata entries and the need for queries usually not found within classical library information systems demands for new approaches for the handling of metadata. The results of a research project comparing different concepts for the management of metadata for digital and analog (geo-)spatial information are presented, together with a new approach for the management of tree based metadata including hyperlinks between related metadata entries.