

Designing Geodatabases

Case Studies
in GIS Data
Modeling

ESRI has been working with our GIS user community during the last several years to develop a set of "best practices" geodatabase designs for various application domains. These database designs are intended to help GIS users rapidly become productive with the geodatabase and to share "what really works" among our user and developer communities.

This book has two primary goals:

- Providing a series of domain data models that represent commonly used GIS data sets by applying best practices for GIS data modeling and collection. These data models are intended to provide a series of templates for implementing geodatabases for specific solutions.
- Communicating a practical GIS database design process. As a GIS professional, you will need to learn and apply practical GIS database design methods. Gaining GIS design skills will be important to your success in your job.

A series of designs derived from specific case studies are presented throughout the book, including:

- Streams and river networks
- Census units and boundaries
- Addresses and locations
- Parcels and the cadastre
- Federal lands survey
- Raster data use
- Cartography and the basemap

Building accurate geodatabases is the foundation for meaningful and reliable GIS. By documenting actual case studies of successful ArcGIS® implementations, *Designing Geodatabases* makes it easier to envision your own database plan.



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chapter 1

geodatabase design **2**

Spatial data modeling is an extension to conventional methodologies for conceptual, logical, and physical data modeling within a relational or object-oriented database. This chapter presents steps to design, a guide for reading data model illustrations, and recurring patterns used in geodatabase design.

chapter 2

streams and river networks **36**

Surface water flow is a fundamental part of many maps. It is also the subject of intense examination and research to understand and anticipate the effects of irrigation, storms, and flooding. This chapter summarizes the key points of Arc Hydro, a mature data model for hydrographic and hydrologic modeling applications.

chapter 3

census units and boundaries **86**

Census data comprises two main types of information: location and demographics. This data model focuses on the spatial hierarchy of physical features, census blocks, block groups, tracts, and higher-level administrative units. With these concepts, the rich demographic data can be easily joined to the spatial features for further analysis.

chapter 4

addresses and locations **126**

Streets can have multiple names and address ranges; buildings, parcels, and points of interest can have multiple addresses and subaddresses; and addresses can have many different styles and be used by multiple features. This case study from Calgary, Canada, shows how to support such complex relationships in a straightforward way.

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chapter 5

parcels and the cadastre 166

Based on a case study from Oakland County, Michigan, this data model shows how to integrate survey control with the parcel framework and provides a decision tree for choosing parts of the model to use. It presents alternative ways of modeling parcels and ownership and discusses history tracking and cartography.

chapter 6

surveying federal lands 220

This data model is based on the U.S. BLM National Integrated Land System, used for managing case records pertaining to transfers and subdivisions of public lands. The chapter describes the work flow and key modules of NILS: survey management, measurement management, legal description fabric, and parcel management.

chapter 7

using raster data 280

Raster imagery is used in several distinct ways: as scanned maps, as grids of measurement data, as aerial and satellite orthophotos, and as time series of any of these rasters. This chapter provides guidelines for the best ways of managing raster data in a geodatabase using raster datasets, raster catalogs, and mosaics.

chapter 8

cartography and the base map 306

This case study examines two distinct issues: demonstrating the development of a topographic base map based on a case study from the Texas Natural Resources Information System, and extending a GIS to support cartographic quality output, using the topographic base map for illustration.

chapter 9

building geodatabases 374

As you design your data model, you will use ArcGIS tools and techniques to build the geodatabase. This chapter presents six steps for implementing your design.