

Implementing Geodatabases with Data Models #1030



Presenter

The CADD/BIM Technology Center

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Paper Title

Implementing Geodatabases with Data Models

Paper Abstract

Implementing geodatabases with data models requires processes and procedures that describe the transformation of the required data structure to a managed model-driven architecture of a logical data model, the transformation of the model to an implementation, and the migration of legacy schemas to compliant required implementations. The model should be specified and the initial transformation from an implementation-based standard to a model-based standard should be explained along with the methodology for producing implementations from the model, and the methodology for migrating legacy systems to the required compliant implementation. These explanations should contain algorithms to perform these operations to provide software developers an initial approach to developing and modifying a data model toolset.

Goal

Develop processes and procedures to describe:

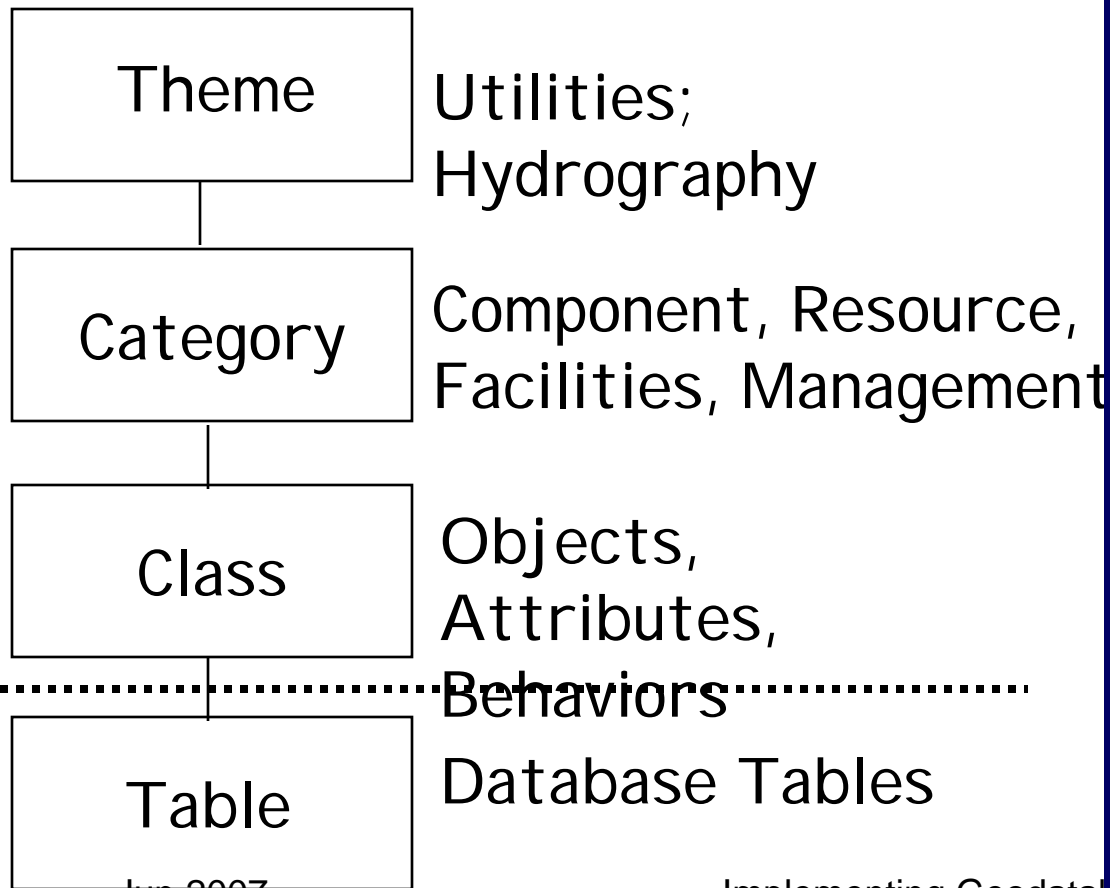
- the transformation of the required data structure to a managed model-driven architecture of a logical data model
- the transformation of the model to an implementation
- the migration of legacy schemas to compliant required implementations.

Objectives

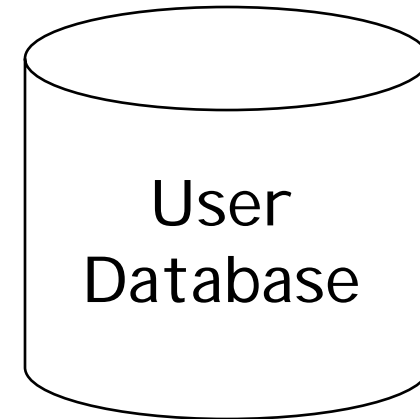
- Produce object and data models
- Develop detailed explanation of the initial transformation from an implementation-based standard to a model-based standard
- Develop algorithms to provide developers an initial approach to developing and modifying a data model toolset
- Document methodology for producing implementations from the model and for migrating legacy systems to the required compliant implementation

Data Structure

Vendor-neutral Hierarchy



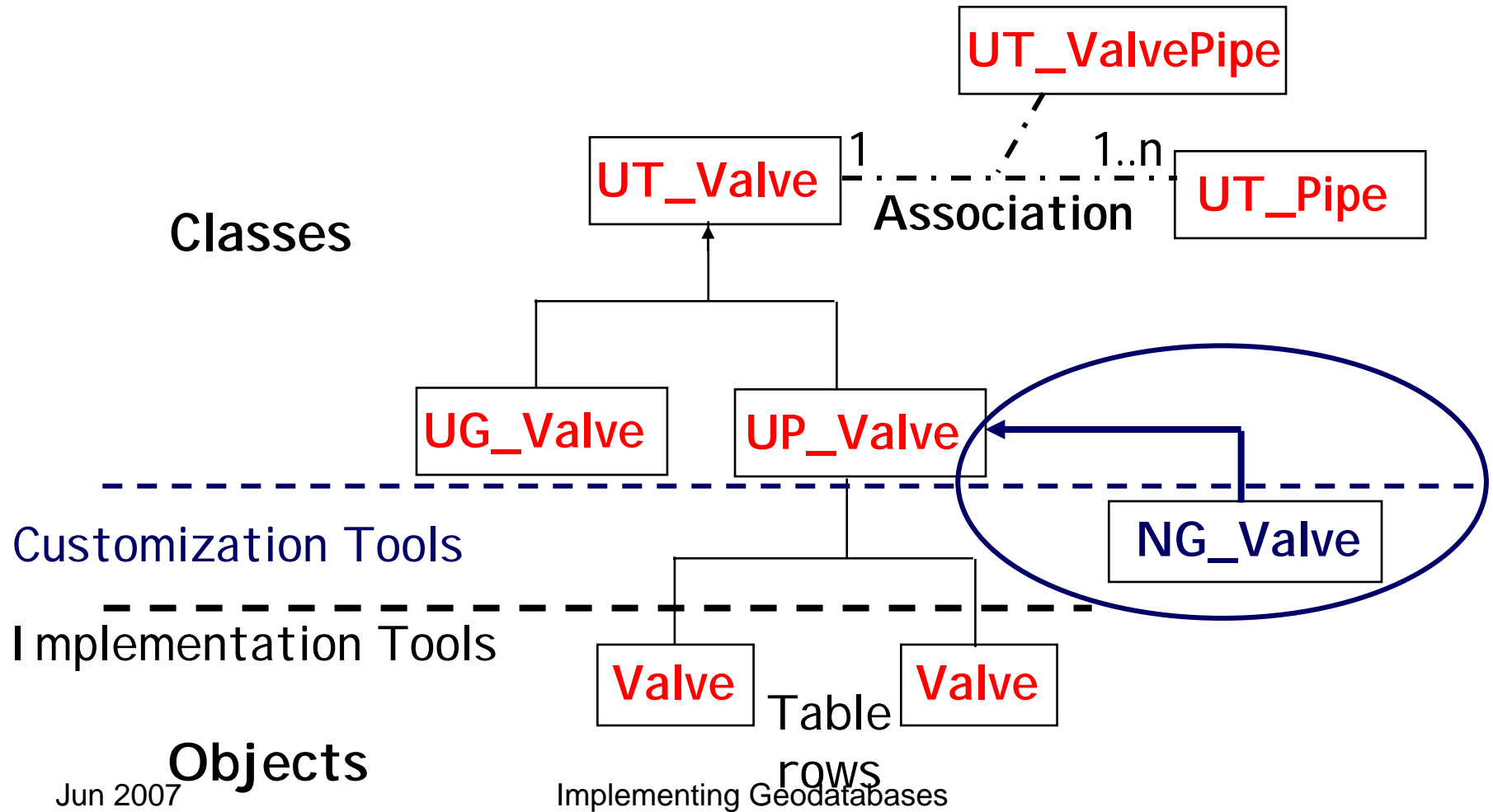
Implementation



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Class

Objects, Attributes, Behaviors



Approach

- Define modeling process
- Perform analysis of attributes
- Establish initial Policy for modeling
- Define rules to automate for conversion algorithms
- Develop applications to migrate data

Modeling Process

- Reverse-engineer current data into a data model
- Manually generate a root class called DataObject
- Analysis:
 - abstract classes of “most used attributes”
 - new classes based on common attributes (same table; many features)
 - associations between classes (relationships defined)
 - identify keys (primary & foreign)

Attribute Analysis

Object Model	Data Model	User Data Model	Implementation Model
Class	Table	Table	Table
Boat_ramp	Boat_ramp	Boat_ramp_area Boat_ramp_line Boat_ramp_point	Boat_ramp_area Boat_ramp_line Boat_ramp_point
Current data	Inherited attributes and relations Filter	User-defined augmentation Geometry assigned	GIS COTS software

Initial Policy

- Data organization rules:
 - A DataObject root class is required
 - Abstract classes may be defined for common attributes
 - Establish current features & definitions will be utilized
 - All current components will be modeled (if it has a home today, it will have a home tomorrow)
- Feature organization rules:
 - Allow features to have “any” geometry
 - Every feature must have a name & description
 - Every feature will inherit different attributes according to its geometry
- Non-graphic organization rules:
 - Create Common Nongraphic Class consisting of the contents of the current common nongraphic metadata

Automation Rules

- Define naming conventions & OGC changes mechanism
- Create productivity tools to continue the comparative analysis
 - Rational Rose scripts
 - Export SQL scripts
 - Custom data types
 - Naming conventions
- Test tools on Data Model & refine methodology/tools
- Prioritize remaining data classes
- Define format of behaviors
- Define actual behaviors (3" pipe to 1" valve)
- Create tools which use this format to populate database behavior

I ssues

- Determine how or if on incorporation of BIM into Object Model
- Topology (geometry, coordinates, etc.)
- Temporal (approach and impact on facilities data)
- Ability of GIS vendors to implement object models
- Object Data Model maintenance
- Disseminate object approach and efforts to current users

Migration Procedures

Migrating Data from a known source into the new model requires a consideration of the following:

- Geometry Constraints
- Projection Constraints
- Field/Attribute Constraints
- Value Constraints (Field to Field)
- Value Constraints (Value to Value)
- Constants
- Metadata



Data Geodatabase Complex Loader Tool

Concept - Migrating data

Develop a computer application that will automate the loading of a Geodatabase with Source Data from a variety of formats (Coverage, Shape File, etc) and a variety of structures (the contained fields) into an Data compliant Geodatabase in either Personal or SDE format, considering the constraints of geometry, projection, fields, values, and constants.

Questions

