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Editing Strategies for Enterprise Geodatabases

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Assumptions

- Basic knowledge of relational databases
- Basic knowledge of the Geodatabase data model
 - Many other session that focus on this
- We'll hold all questions till end

Please Turn Off Cell Phones



Session Path

- **Introduction to the Enterprise Geodatabase**
 - What is the Geodatabase?
 - The Geodatabase Management Approach
 - Different types of Geodatabases
 - What are the benefits of a Enterprise Geodatabase?
- **Versioning**
- **Types of Editing**
- **Archiving**
- **Geodatabase Replication**

What is the Geodatabase?

- **A physical store of geographic data**
 - Scalable storage model supported on different platforms
- **Core ArcGIS data model**
 - A comprehensive model for representing and managing GIS data
- **A transactional model for managing GIS workflows**
- **Set of COM components for accessing data**




Geodatabase Data Management Approach

- **The Geodatabase is built on an extended relational database.**
 - **Base relational model**
 - **Base short transaction model**
 - **Relational integrity**
 - **Reliability, Flexibility, Scalability**
- **Simple features + logic**
 - **All geographic data stored as tables in a DBMS**
 - **Functionality is consistent across DBMS'**
- **Extend functionality and data integrity**

Geodatabase Data Management Approach...

- **Editing and data compilation**
 - **Rich set of editing tools**
 - **Maintain spatial and attribute integrity**
 - **Undo and redo edits**
 - **Multiple users editing the same data**
- **Robust, customizable framework**

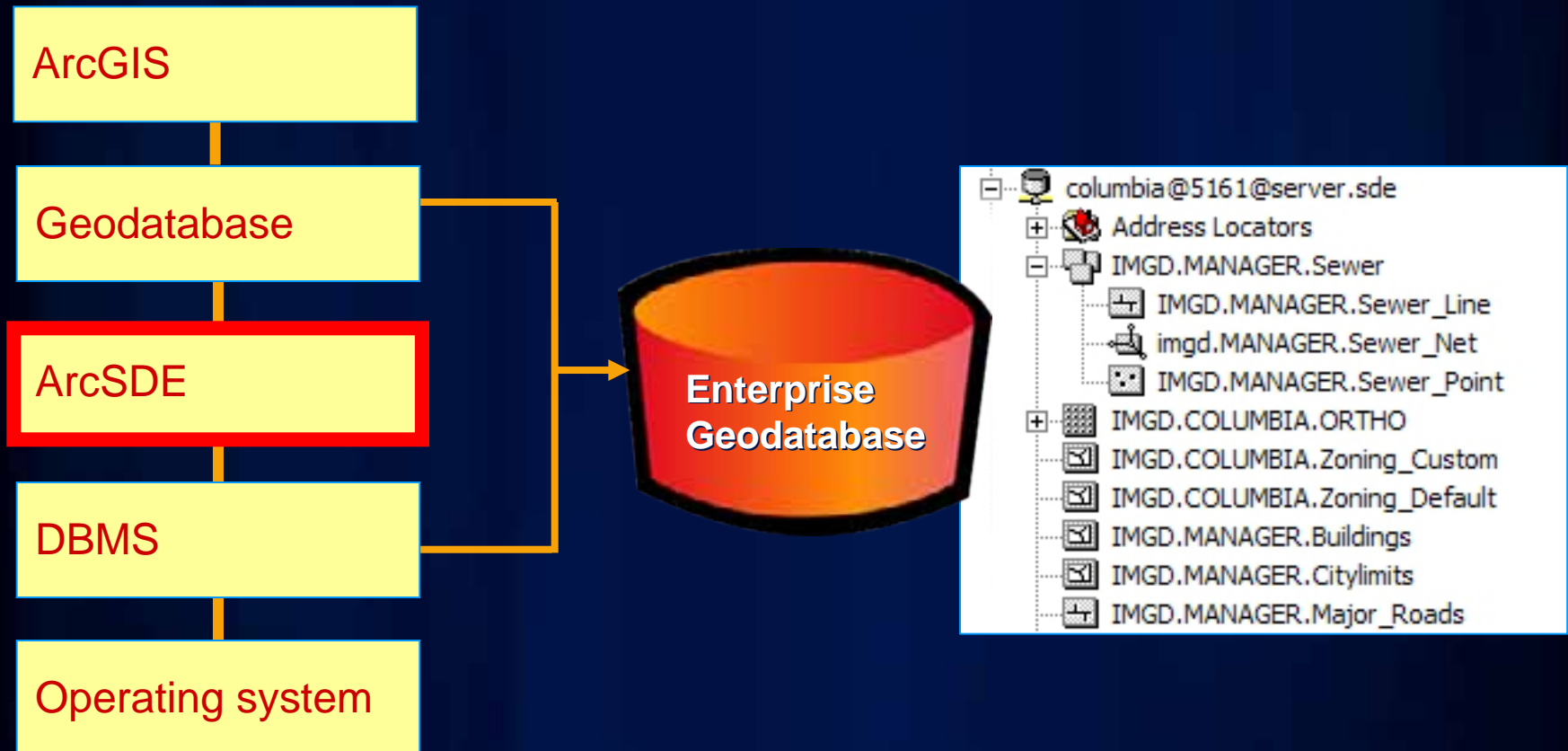
Three Types of Geodatabases

	Personal GDB 	File GDB 	Enterprise GDB (3 editions) 
Storage format	Microsoft Access	Folder of binary files	DBMS
Storage capacity	2 GB	1 TB per table*	Depends on edition
Supported O/S platform	Windows	Any platform	Depends on edition
Number of users	Single editor Multiple readers	Single editor Multiple readers	Multiple editors & readers
Distributed GDB functionality	Check out/check in One way replication	Check out/check in One way replication	Replication (all types) & versioning

What is an Enterprise Geodatabase?

- Also referred to as an ArcSDE Geodatabase
- ESRI's technology for accessing and managing geospatial data in relational databases
- Enterprise Geodatabases are unique in their support of the following capabilities:
 - Open and interoperable across many supported DBMSs
 - Offers support for full, open SQL access to geodatabases
 - Versioning, Replication and Archiving

How is ArcSDE technology included in ArcGIS?



Which Enterprise Geodatabase edition?

	ArcSDE for ArcGIS Desktop	ArcSDE for ArcGIS Server Workgroup	ArcSDE for ArcGIS Server Enterprise
ArcGIS Product	ArcGIS and Desktop Engine*	ArcGIS Server Workgroup	ArcGIS Server Enterprise
Number of users	Max 3 users, 1 editor at any one time	Max 10 clients at one time No limit to the number of connections	Unlimited
Supported DBMS	SQL Server Express 2005	SQL Server Express 2005	Oracle, SQL Server, DB2, Informix, PostgreSQL
Database limits	Max database size 4 Gig 1 GB RAM on a single cpu	Max database size 4 Gig 1 GB RAM on a single cpu	No limits
Administration	ArcGIS Desktop (ArcCatalog)	ArcGIS Desktop (ArcCatalog)	ArcGIS Desktop, Command line tools, DBMS admin software

Scale from small, personal systems up to workgroups and very large enterprises

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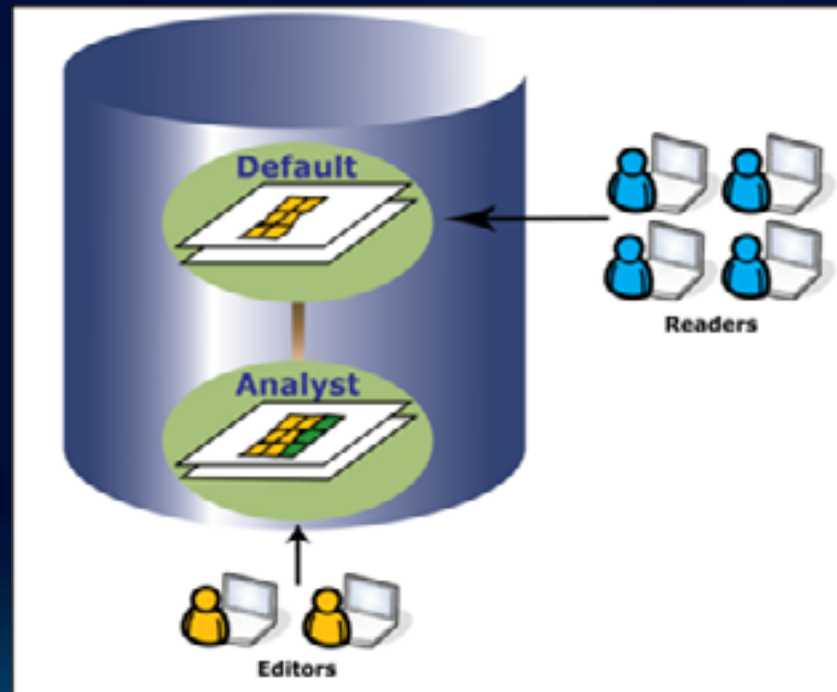
Scale from small, personal systems up to workgroups and very large enterprises

Session Path

- Introduction to the Enterprise Geodatabases
- **Versioning**
 - **What is it?**
 - **Why Use Versioning?**
- Types of Editing
- Archiving
- Geodatabase Replication

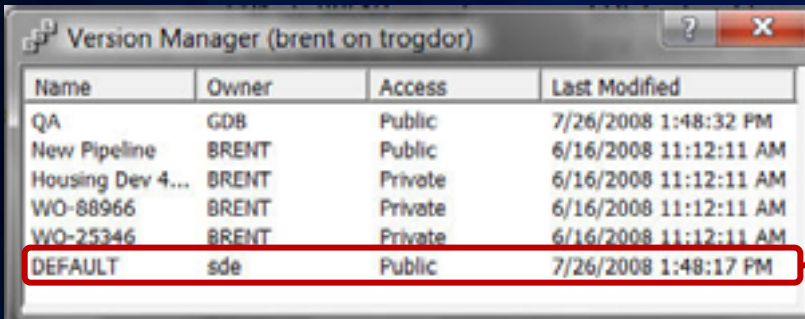
Versioning: What is it?

- Technology that allows multiple users to edit and view data at the same time
- Appears to users as if they have their own copy of a table
- Does not apply locks or duplicate data



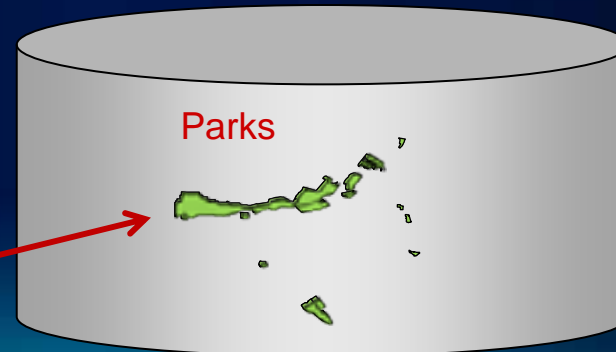
What is a Version?

- An alternative view of the Geodatabase that has:
 - an owner
 - a description
 - a permission
 - a parent version
- Versions are not affected by changes occurring in other versions of the database



Version Manager (brent on trogdor)

Name	Owner	Access	Last Modified
QA	GDB	Public	7/26/2008 1:48:32 PM
New Pipeline	BRENT	Public	6/16/2008 11:12:11 AM
Housing Dev 4...	BRENT	Private	6/16/2008 11:12:11 AM
WO-88966	BRENT	Private	6/16/2008 11:12:11 AM
WO-25346	BRENT	Private	6/16/2008 11:12:11 AM
DEFAULT	sde	Public	7/26/2008 1:48:17 PM



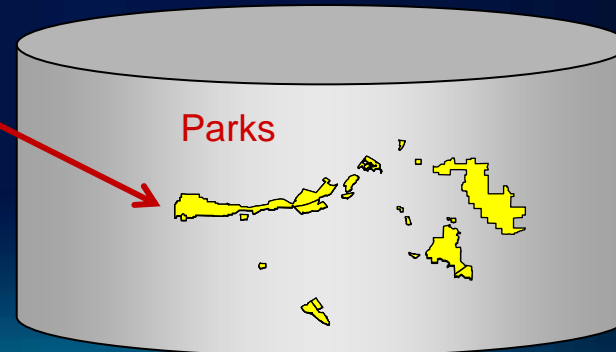
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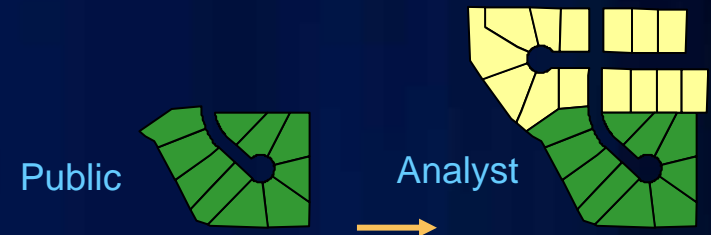


Why Use Versioning?

- **Multiple Editors Accessing Data**
- **Need Different Views of the Data**
- **Editing Complex Data (e.g. Geometric Networks)**
- **Replication and Archiving**

Why Use Versioning?...

- **Editing with long transactions**
 - Isolate work across multiple sessions
 - Edits do not impact others
- **Model what-if scenarios**
 - Simulate situations with versions
- **Workflow management**
 - Create versions for project stages



Session Path

- Introduction to the Enterprise Geodatabase
- Versioning
- **Types of Editing**
 - **Versioned Editing**
 - **Non-Versioned Editing**
 - **Editing through SQL**
- Archiving
- Geodatabase Replication

Editing Geodatabases

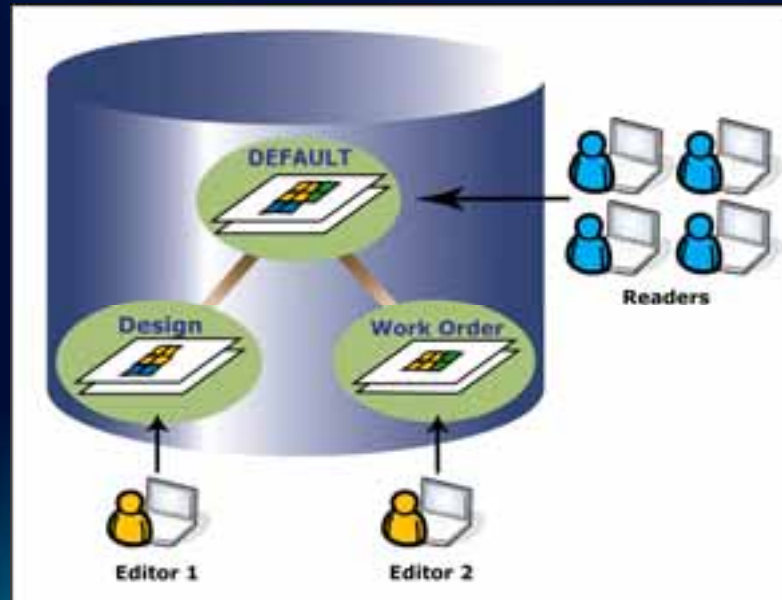
- **Short Transactions**
 - Small number of operations completed quickly
 - E.g., ATM transactions, Library records, Timecards
 - Concurrent transactions are isolated
- **Long Transactions**
 - Large number of operations over a long time period
 - E.g., Parcel updates, General geographic editing
 - Multiuser editing without locking or data duplication
 - Editors work with unique isolated view of the geodatabase
- **GIS editors need both short and long transactions**

Three different ways of editing Geodatabases

- **Editing in a version through ArcGIS**
 - **Versioned Editing (Long Transactions)**
- **Editing the data directly through ArcGIS**
 - **Non-Versioned Editing (Short Transactions)**
- **Editing the data directly through SQL**
 - **Editing through SQL (Short Transactions)**

Versioned Editing

- **Versioned Edit Sessions**
 - Editing done through a version
 - Support concurrent editing with long transactions (hours/days)
 - Undo/redo editing experience
 - No locking or data extraction required



How Versioning Works

- Class must be registered as Versioned
 - Creates Adds and Deletes tables for tracking edits

Registering data as versioned

This creates the delta tables

1	2	
3	4	5

Base Table

ObjectID	Perimeter	Bldg_Code
1	10105.15	02
2	10105.15	02
3	11348.31	02
4	10827.18	02
5	11348.31	02

Adds Table

ObjectID	Perimeter	Bldg_Code	SDE_State_ID

Deletes Table

Deleted_At	Deletes_Row_ID	SDE_State_ID

How Versioning Works

- Adding Features
 - Record added to the Adds Table
 - Version will be referenced (SDE_State_ID Field)

Adding a Feature

Inserts a row in the Adds table

6		
1	2	
3	4	5

Base Table

ObjectID	Perimeter	Bldg_Code
1	10105.15	02
2	10105.15	02
3	11348.31	02
4	10827.18	02
5	11348.31	02

Adds Table

ObjectID	Perimeter	Bldg_Code	SDE_State_ID
6	10105.15	02	27505

Deletes Table

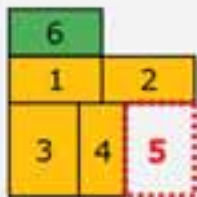
Deleted_At	Deletes_Row_ID	SDE_State_ID

How Versioning Works

- Deleting Features
 - Record added to Deletes Table
 - Version will be referenced (Deleted_At field)

Deleting a Feature

Inserts a row in the Deletes table



Base Table

ObjectID	Perimeter	Bldg_Code
1	10105.15	02
2	10105.15	02
3	11348.31	02
4	10827.18	02
5	11348.31	02

Adds Table

ObjectID	Perimeter	Bldg_Code	SDE_State_ID
6	10105.15	02	27505

Deletes Table

Deleted_At	Deletes_Row_ID	SDE_State_ID
27506	5	0

How Versioning Works

- **Updating Features**

- Record added to both Adds and Deletes table
- Version will be referenced (SDE_State_ID Field)

Updating a Feature

Inserts a row in both the Adds and Deletes tables



Base Table

ObjectID	Perimeter	Bldg_Code
1	10105.15	02
2	10105.15	02
3	11348.31	02
4	10827.18	02
5	11348.31	02

Adds Table

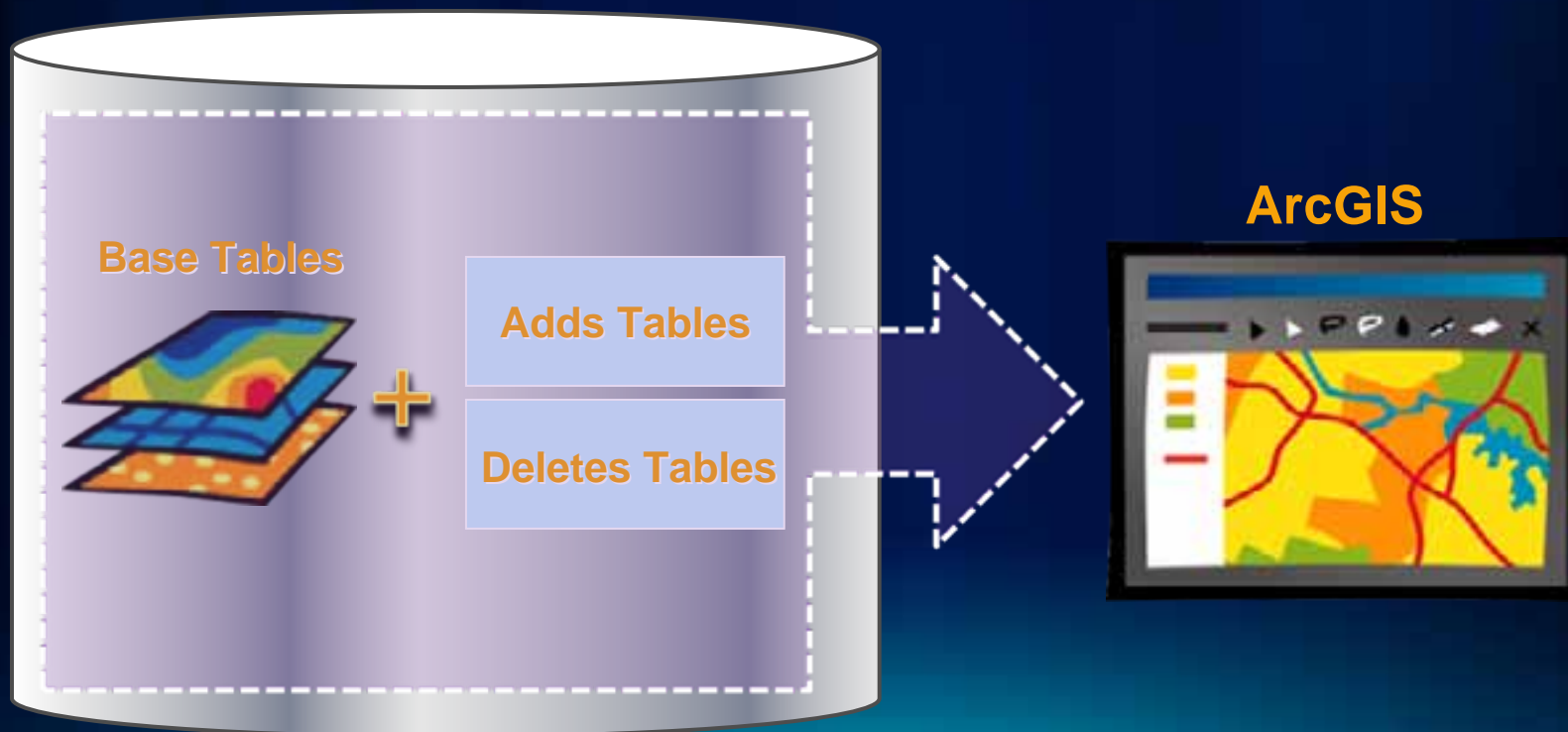
ObjectID	Perimeter	Bldg_Code	SDE_State_ID
6	10105.15	02	27505
2	20210.30	02	27507

Deletes Table

Deleted_At	Deletes_Row_ID	SDE_State_ID
27506	5	0
27507	2	0

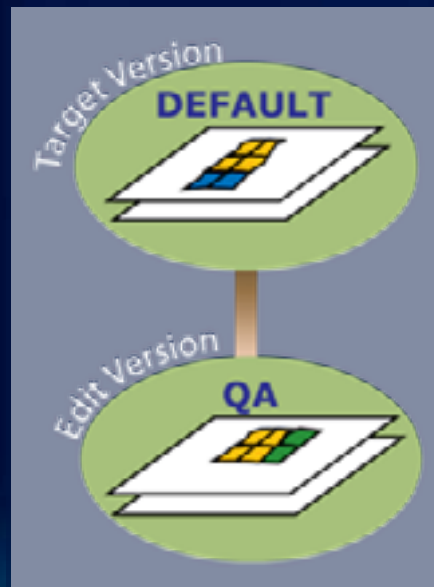
How Versioning Works

- Versioned representation of a feature class is a combination of records in:
 - Base Tables, Adds Tables & Deletes Tables



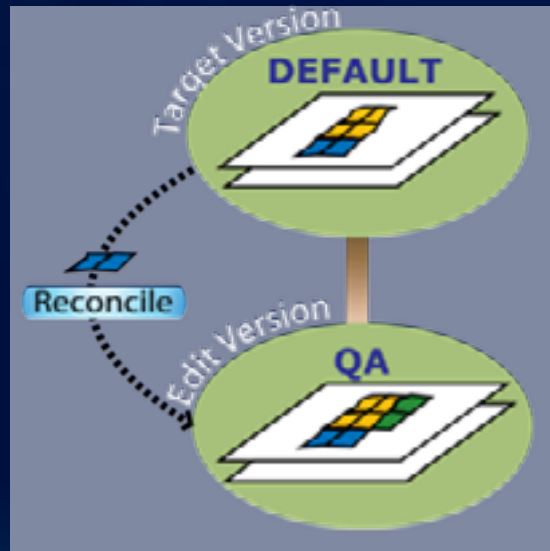
Versioned Editing – Reconcile and Post

- How can versions be merged?
 - Through a process called reconcile and post



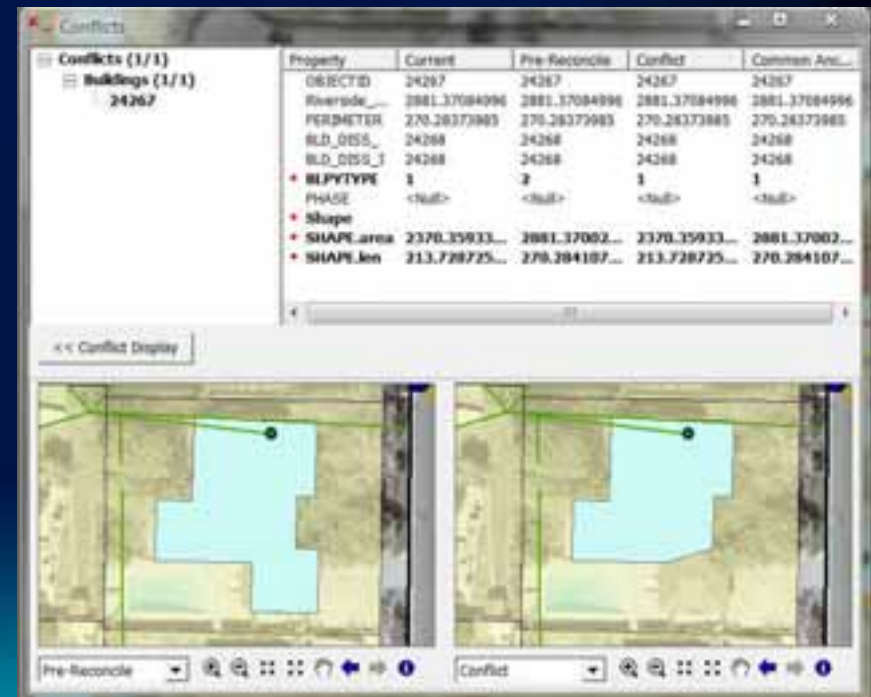
Versioned Editing – Reconcile

- Reconcile pulls any changes from the target version into the edit version
 - Any conflicts will be detected



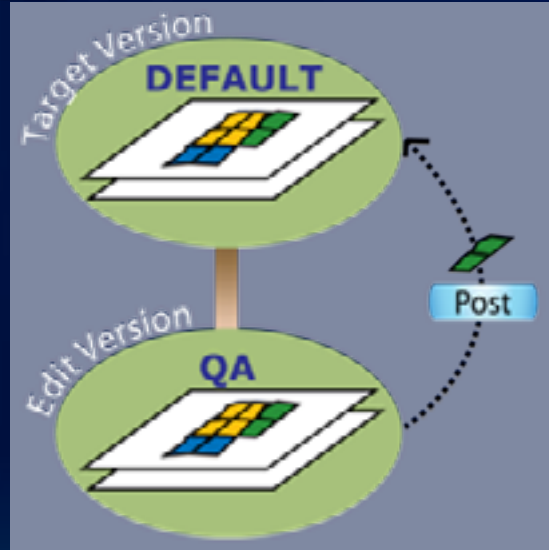
Reconcile and Conflicts

- Versioning does not lock data when it is edited
 - Because of this we must make sure data is not overwritten
 - We do this through conflict detection during a reconcile
- A feature will be in conflict any time it has changed on both versions
- Conflict Resolution Dialog

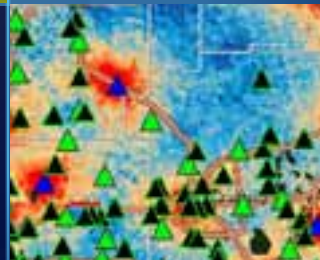


Versioned Editing – Post

- Posting versions merges any changes in the edit version into the target version
 - After a post versions are identical



Versioned Editing Demo

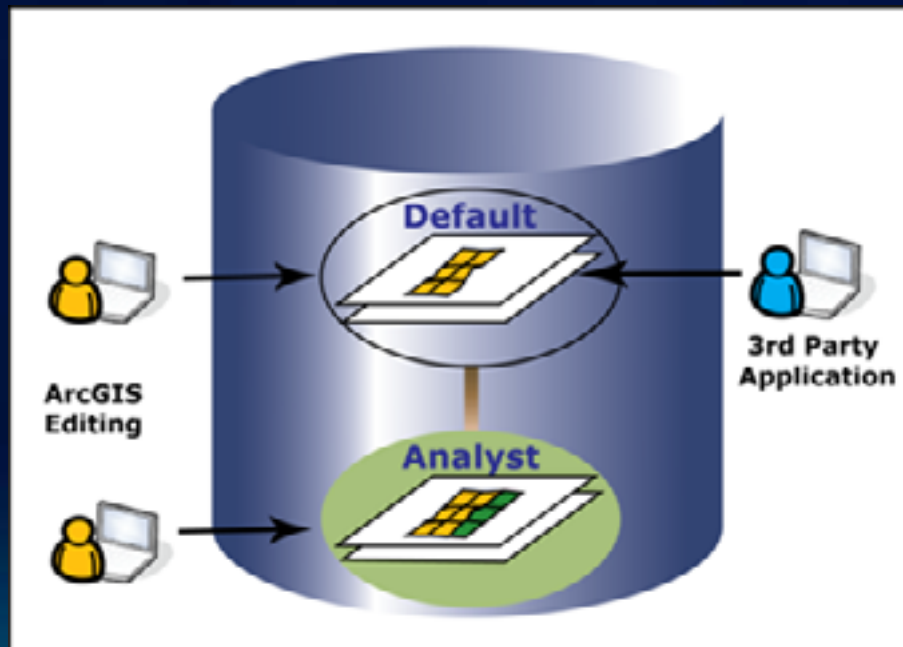


Versioned Editing - Move to Base Option

- **What is it?**
 - Versioned editing with the ability to move changes made in the Default version into the base tables
 - Changes made in non-Default versions are still stored in the delta tables
- **Designed for IT integration**
 - Edits visible to 3rd part applications as soon as they are saved
- **Simple data only**
 - Points, lines, polygons, annotation, relationship classes
 - No Topology, Geometric Networks...etc

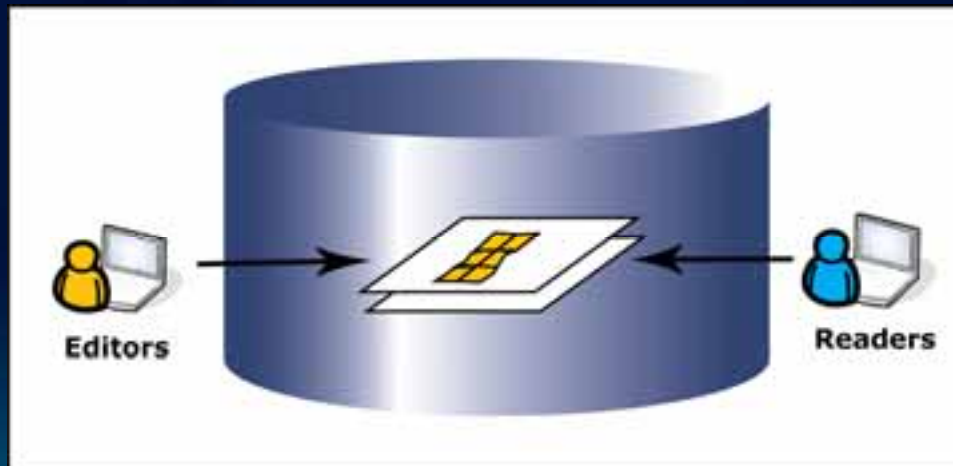
Versioned Editing - Move to Base

- Why would I use the move to base option?
 - Want version editing experience but...
 - Need to integrate with 3rd party applications
 - Use of database constraints when editing DEFAULT version



Non-Versioned Editing

- **Directly editing the database tables**
 - Not editing in a version
- **Designed for IT integration**
 - Suggested for Non-ESRI client interaction
 - Database integrity rules
 - Simple data only (Points, Lines, Polygons) , No Topology, Geometric Networks...etc



SQL Editing

- SQL can be used to update data directly
- Geometry editing possible through spatial types
 - All supported databases have spatial types
- Spatial Types
 - Why are they useful?
 - ESRI Client not necessary to edit data
 - SQL access to geometries

Geodatabase Editing Summary

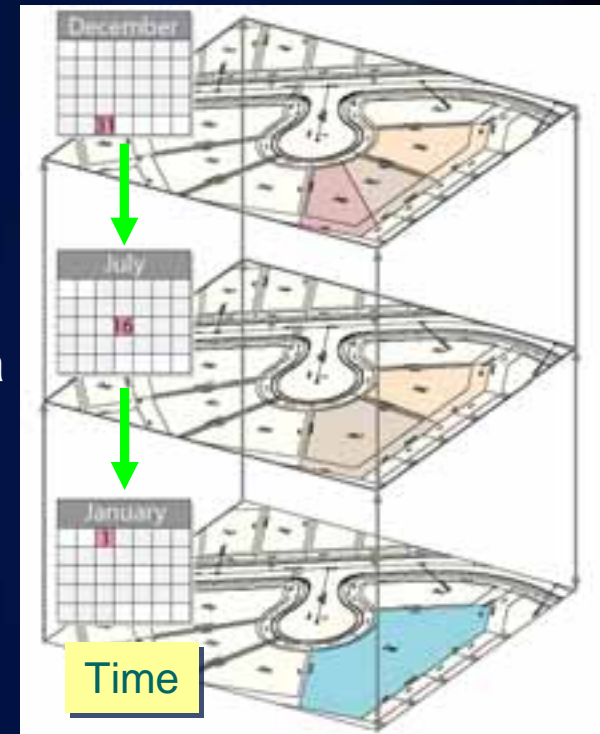
- **Three ways to edit data**
 1. **Editing through a version in ArcGIS (Versioned Editing)**
 2. **Editing data directly in ArcGIS (Non-Versioned Editing)**
 3. **Editing directly through SQL (SQL Editing)**
- **Which one do I use?**
- **Depends on behavior desired**
 - **Short vs Long Transactions**
 - **Is data being accessed by non-ESRI applications?**
 - **Are many editors editing the same data?**

Session Path

- Introduction to the Enterprise Geodatabases
- Versioning
- Types of Editing
- **Archiving**
 - **What is it?**
 - **How is it used?**
- Geodatabase Replication

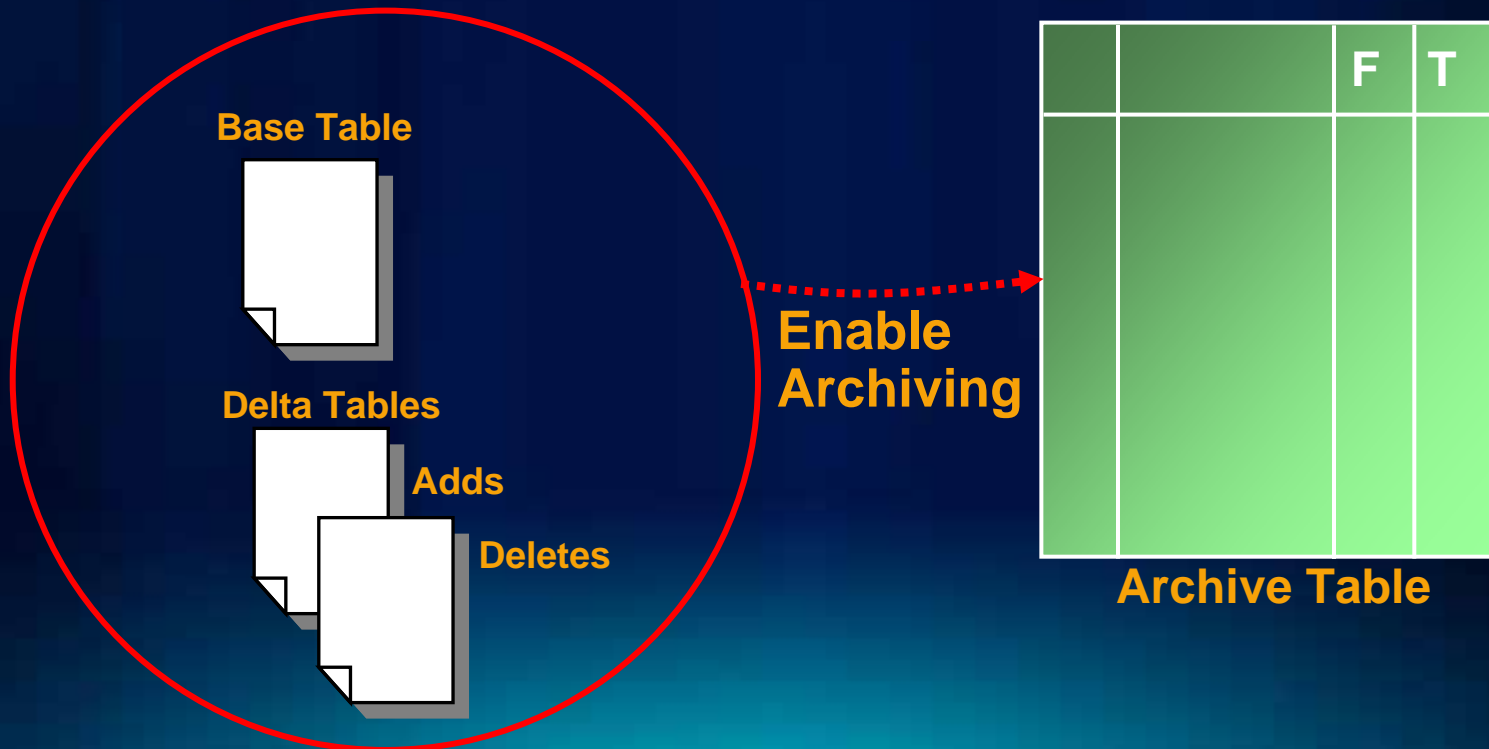
Geodatabase Archiving: What is it?

- **Historical archiving of all edits made to the Default version**
 - Maintain a record of a feature classes representation over time
- **Ability to query historical representations of a feature, can be queried based on date information**
- **Extends versioning**
 - Classes must be versioned before they can be archive enabled



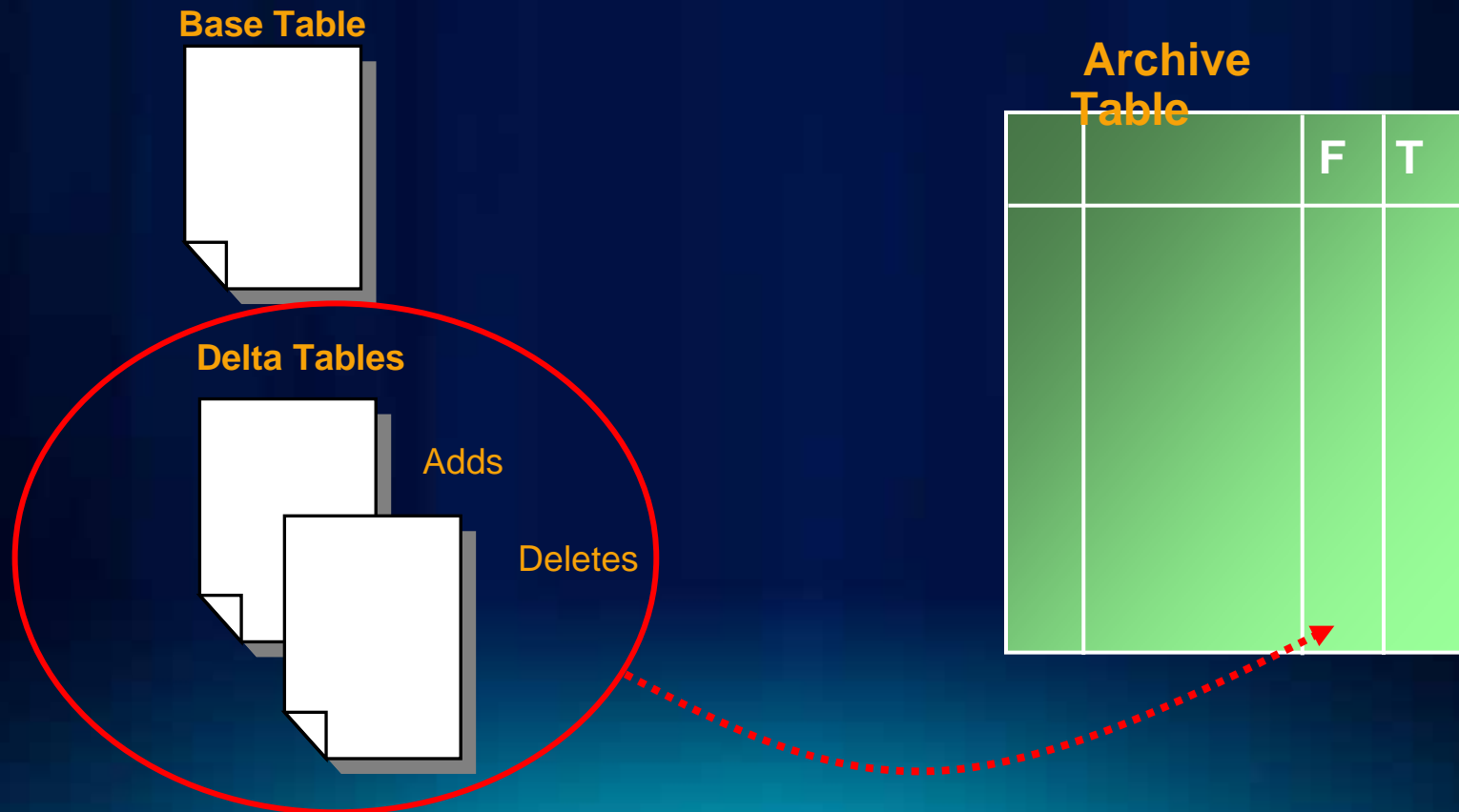
Geodatabase Archiving: How it works

- Class must be enabled for archiving
 - This creates an archive table in the geodatabase
 - Size of archive table depends on size of class being archived



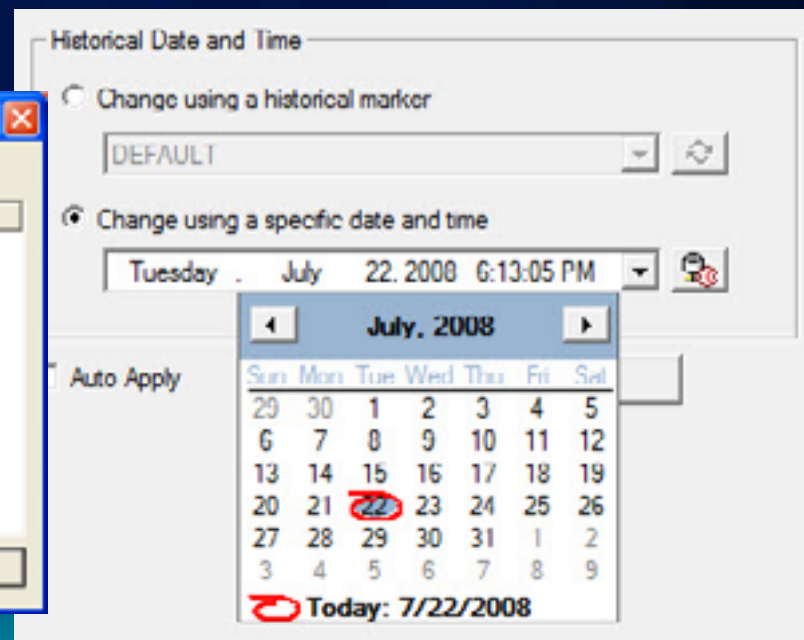
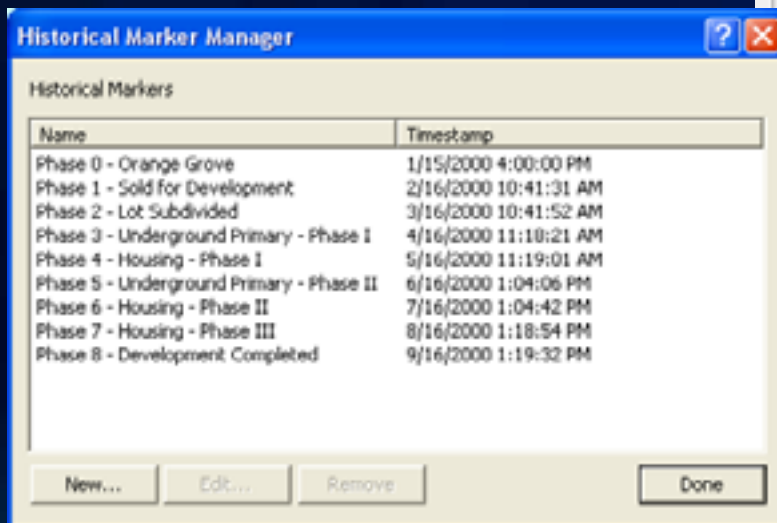
Geodatabase Archiving: How it works

- When edits are made on the Default version
 - These changes are added to the archive table



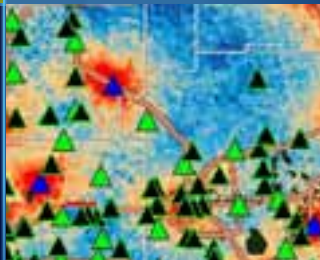
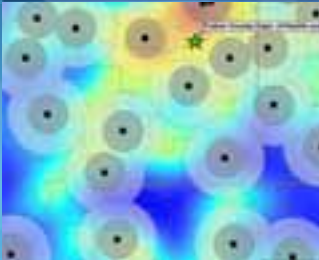
Geodatabase Archiving: How it works

- Archive table is used to satisfy historical queries
- Can navigate through history in two ways
 - Through specific date query
 - Through a historical marker



DeKalb County Board
Fulton County Dept. of Health and Wellness/District 3, Unit 2, 04/10/10

Geodatabase Archiving Demo



Session Path

- Introduction to Enterprise Geodatabases
- Versioning
- Types of Editing
- Archiving
- **Geodatabase Replication**

Synchronizing Data

- What is Replication?



Work off-line or in the field

- **To work off-line**
 - Replicate a subset (Check-out) from enterprise GDB
 - Make edits
 - Check in
- **Intermittently connected**
- **Supports**
 - Full geodatabase model
 - desktop add ins



Synchronize copies of a Geodatabase

- Make edits and synchronize multiple times
- Configurations
 - Changes are sent in one direction to a read-only copy



- Changes are sent in both directions



Geodatabase Replication - Summary

- **The ability to synchronize two or more geodatabases**
- **Different Replication workflows**
 - **One time synchronizations**
 - Work offline or in the field
 - **Long standing synchronizations**
 - Changes sent in one direction
 - Changes are sent in both directions

Session Path - Summary

- **Introduction to the Enterprise Geodatabases**
- **Versioning**
- **Types of Editing**
- **Archiving**
- **Geodatabase Replication**

Thanks for attending Questions?

Please fill out session surveys
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