



Editing Multi-user Geodatabases : An Introduction

Cheryl Cleghorn and Shawn Thorne

Assumptions:

- ✓ **Basic knowledge of relational databases**
- ✓ **Basic knowledge of the Geodatabase data model**
File and Personal Geodatabases

Requests:

- **Please hold questions until Q&A**

- **Please silence smart devices**



Session Path

- **Introduction to the Multi-user Geodatabase**
- **Versioning**
- **Multi-user Geodatabase Editing Strategies**
- **Archiving**
- **Geodatabase Replication**
- **Q & A**




Session Path

- **Introduction to the Multi-user Geodatabase**
 - **What is the Geodatabase?**
 - **The Multiuser Geodatabase Management Approach**
 - **Different types of Geodatabases**
 - **The Multiuser Geodatabase**
- **Versioning**
- **Multi-user Geodatabase Editing Strategies**
- **Archiving**
- **Geodatabase Replication**
- **Q & A**

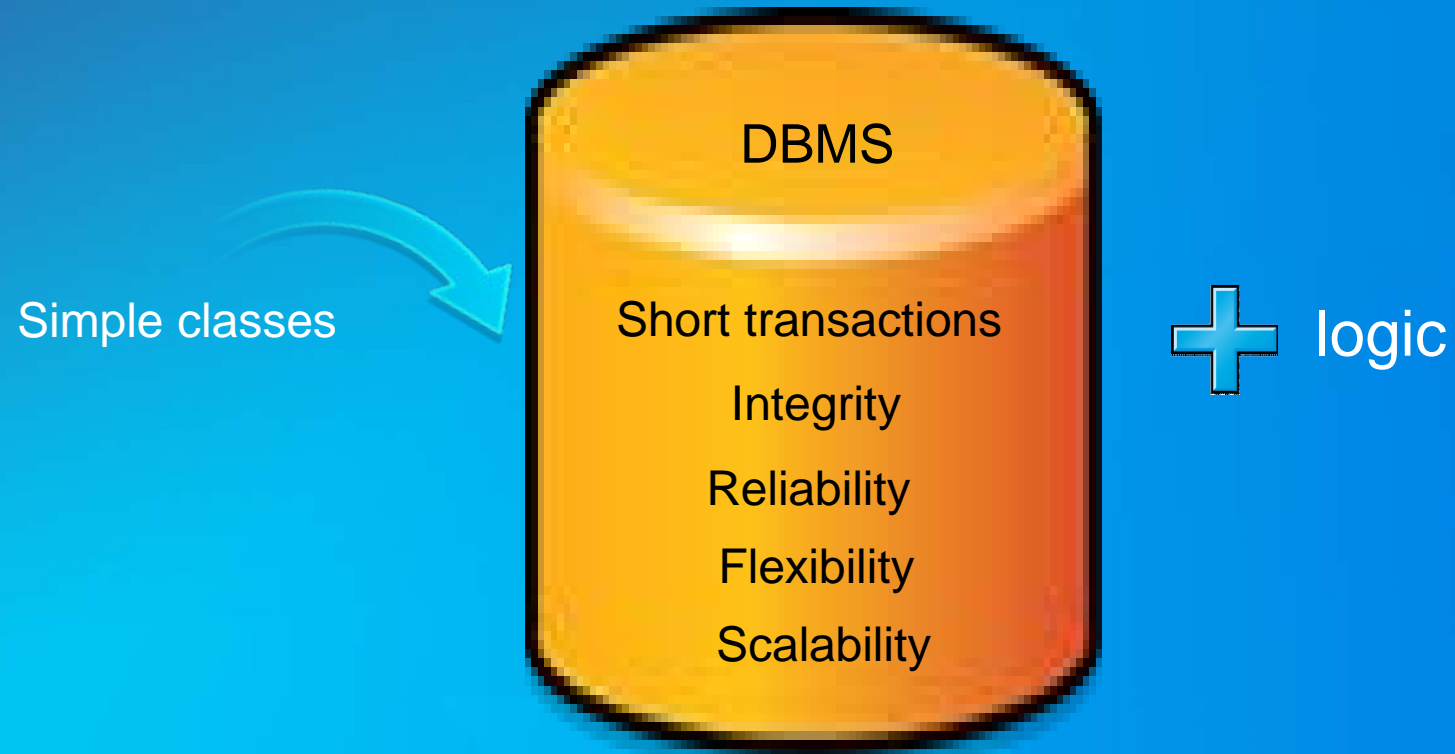
What is the Geodatabase?

- **Physical data store**
- **Core ArcGIS data model**
- **Transactional model**
- **COM components**

Three Types of Geodatabases

	Personal GDB 	File GDB 	Multi-user 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

Multi-user Geodatabase Data Management Approach



Extend functionality and data integrity

Mult-user Geodatabase Data Management Approach...

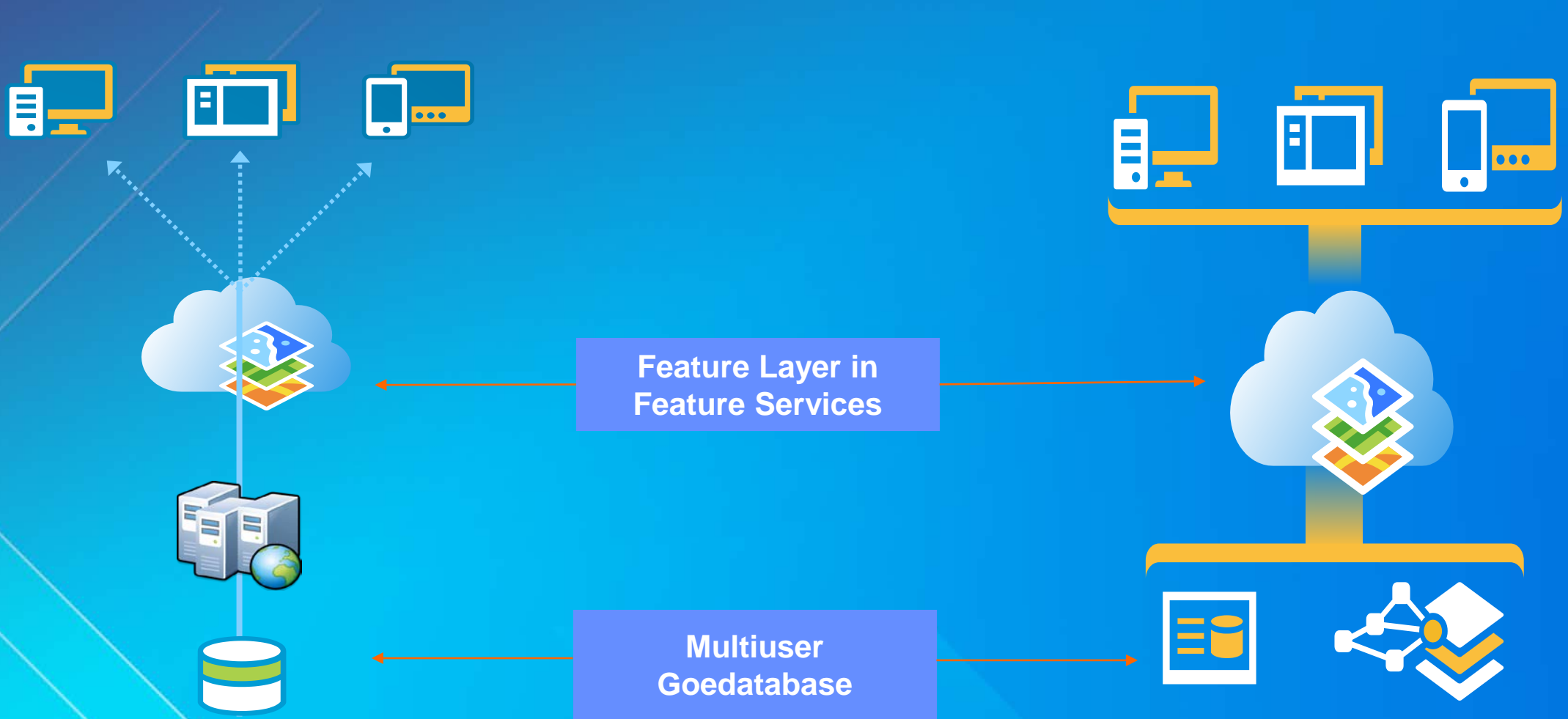
Editing and data compilation



Multi-user Geodatabase Data Management Approach...

- **Versioning workflows**
 - Long GIS transactions
 - Isolation and consistency of long transactions
 - Distributed data management
- **Robust, customizable framework**

WebGIS and the Multi-user Geodatabase



What is a Multi-user Geodatabase?

- **DBMS enabled with ESRI's geospatial technology**
- **Unique capabilities:**
 - **Many supported DBMSs**
 - **Full, open SQL access**
 - **Versioning**
 - **Archiving**
 - **Replication**

Three editions of Multi-user Geodatabase

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

	Desktop	Workgroup	Enterprise
ArcGIS Product	ArcGIS Desktop and Engine	ArcGIS Server Workgroup	ArcGIS Server Enterprise
Administration	ArcGIS Desktop (ArcCatalog)	ArcGIS Desktop (ArcCatalog)	ArcGIS Desktop, Geoprocessing tools

Which Multi-user Geodatabase edition?

	Desktop	Workgroup	Enterprise
ArcGIS Product	ArcGIS Desktop and 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
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Which Multi-user Geodatabase edition?

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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	SQL Server Express	Oracle, SQL Server, DB2, Informix, PostGreSQL
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Which Multi-user Geodatabase edition?

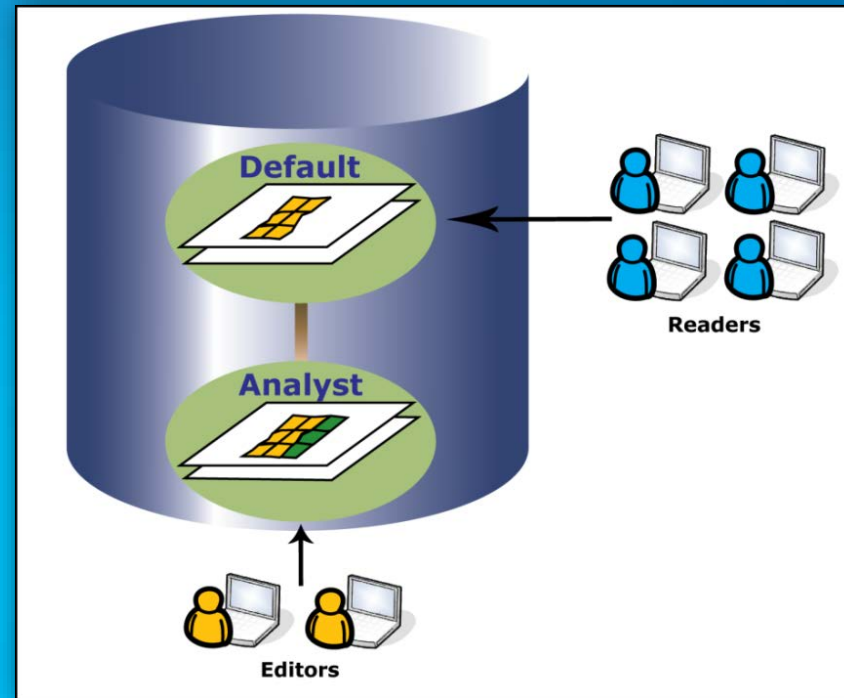
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Supported DBMS	SQL Server Express	SQL Server Express	Oracle, SQL Server, DB2, Informix, PostgreSQL
Resource limits	Max database size 10 GB 1 GB RAM on a single cpu	Max database size 10 GB 1 GB RAM on a single cpu	No limits
Administration	ArcGIS Desktop (ArcCatalog)	ArcGIS Desktop (ArcCatalog)	ArcGIS Desktop, Geoprocessing tools

Session Path

- Introduction to the Multi-user Geodatabases
- **Versioning**
 - **What is it?**
 - **Why Use Versioning?**
- Multi-user Geodatabase Editing Strategies
- Archiving
- Geodatabase Replication
- Q & A

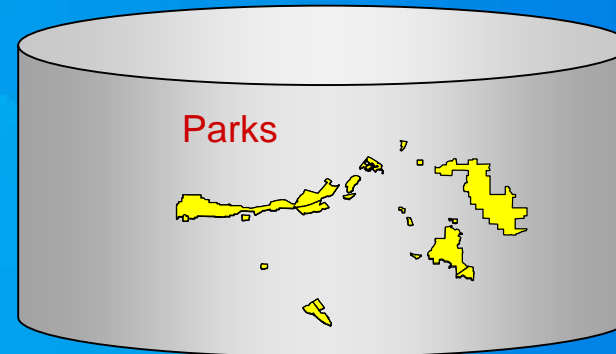
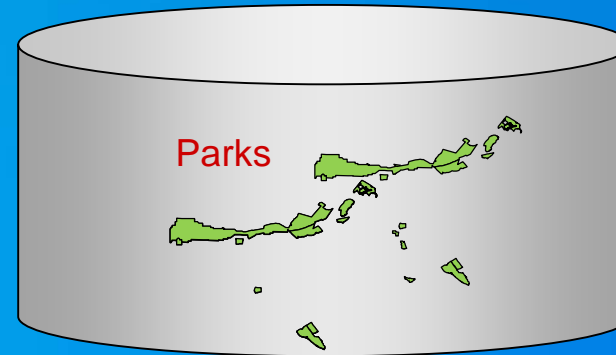
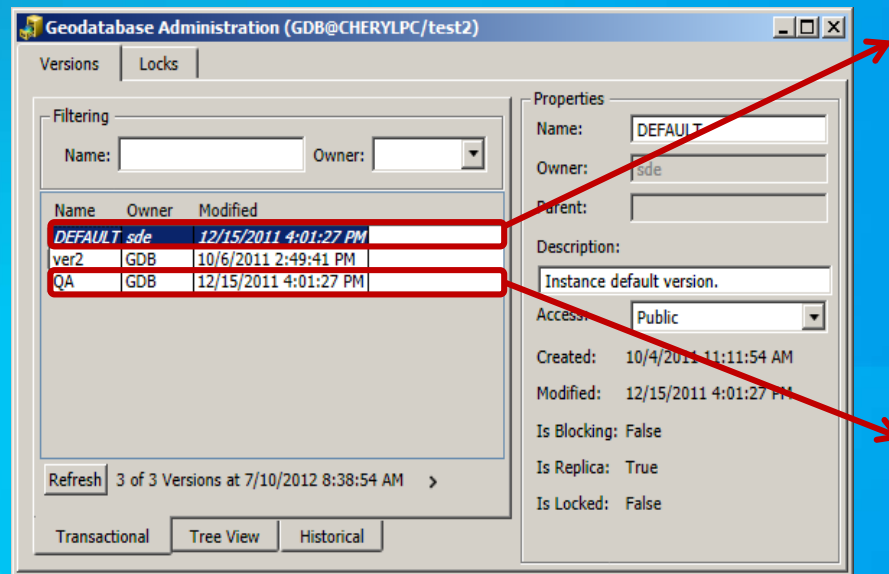
Versioning: What is it?

- Multi-user Technology



Version:

- An alternative view of the Geodatabase
- Edits independent of other versions



Why Use Versioning?

- **Multiple Editors and Edit Sessions / Workflows**
- **Different Views of the Geographic Information**
- **Editing Complex Data (e.g. networks)**
- **Geodatabase Distribution**

Why Use Versioning?...

- **Facilitates long edit transactions**
 - Isolate work across multiple sessions
 - Edits do not impact others
- **Model what-if scenarios**
- **Feature Services Workflows**
 - QA/QC of data collected via feature services
 - Isolate crowd-sourced / community reporting information
 - Information feeds



Session Path

- Introduction to the Multi-user Geodatabase
- Versioning
- **Multi-user Geodatabase Editing Strategies**
 - **Versioned Editing**
 - **Non-Versioned Editing**
 - **Editing through SQL**
- Archiving
- Geodatabase Replication
- Q & A

Editing Multi-user Geodatabases

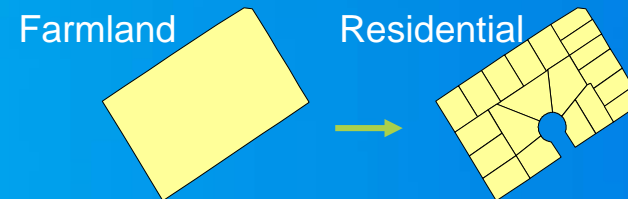
- **Short Transactions**

- E.g., ATM transactions, Library records, Timecards



- **Long Transactions**

- E.g., Parcel updates
- General geographic editing



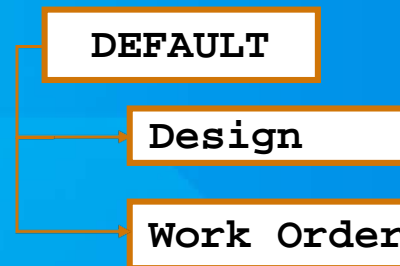
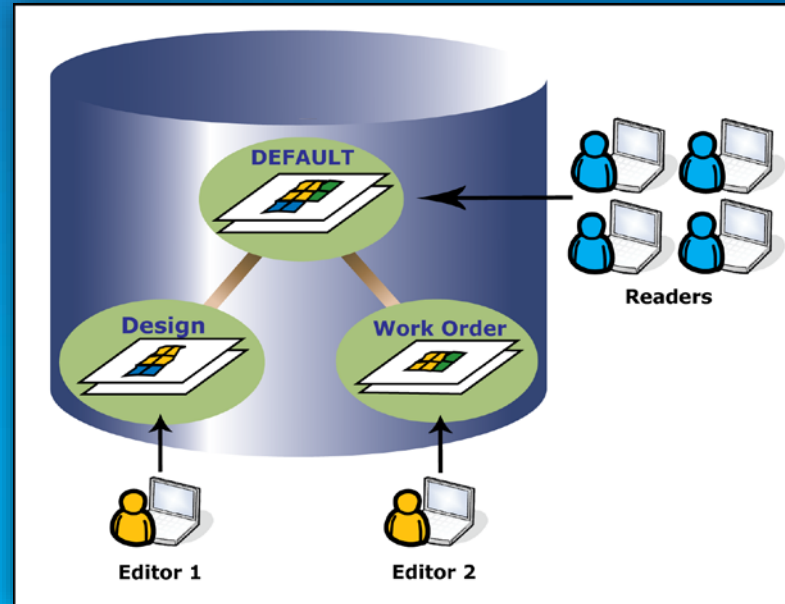
- **GIS editing utilizes both short and long transactions**

Three ways to edit Multi-user Geodatabases

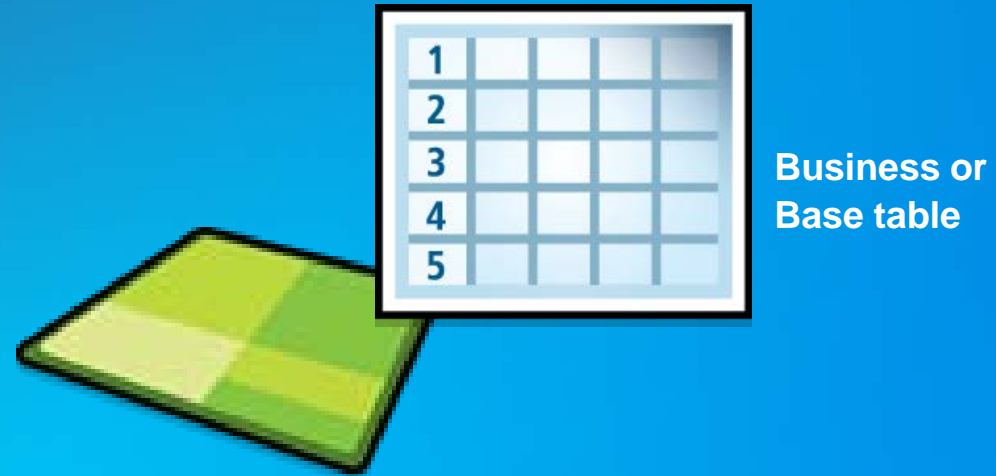
- **Versioned Editing (Long Transactions)**
- **Non-Versioned Editing (Short Transactions)**
- **Editing through SQL (Short Transactions)**

Versioned Editing

- Versioned Edit Sessions
 - Through a version
 - Concurrent editing
 - Long transactions (hours/days)
 - Undo/Redo



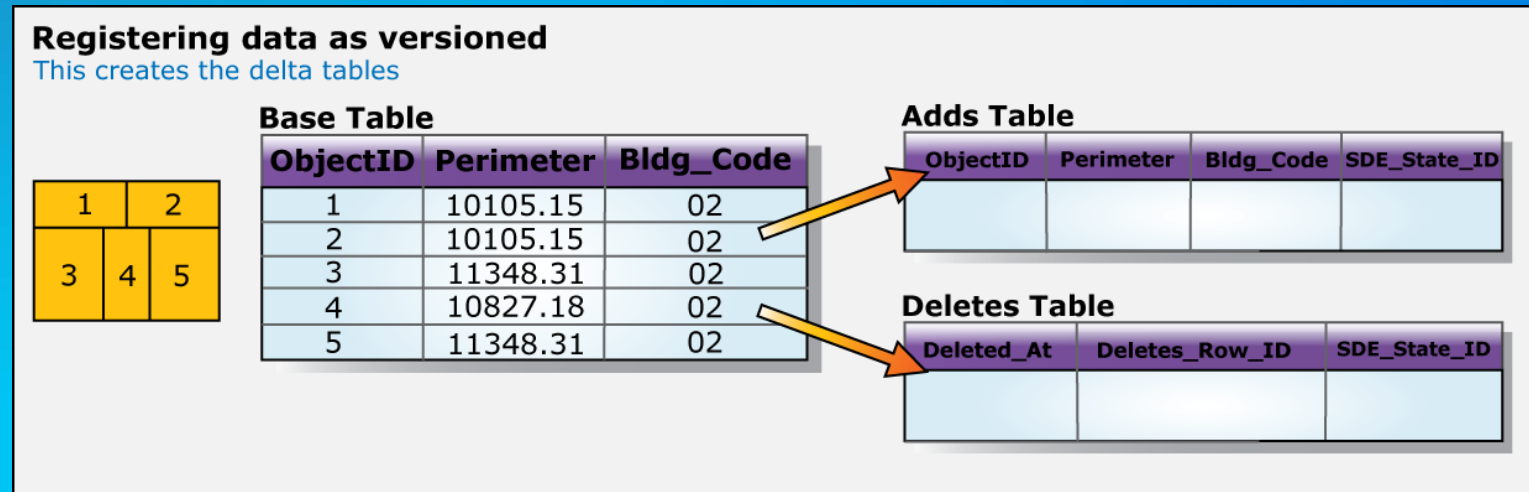
How Versioning Works



-Register as Versioned

How Versioning Works

- Registered as Versioned
 - Creates Adds and Deletes tables for tracking edits



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

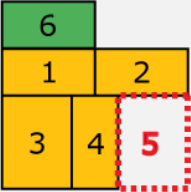
Deleted_At	Deletes_Row_ID	SDE_State_ID

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



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

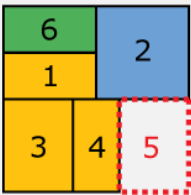
Deleted_At	Deletes_Row_ID	SDE_State_ID
27506	5	0

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

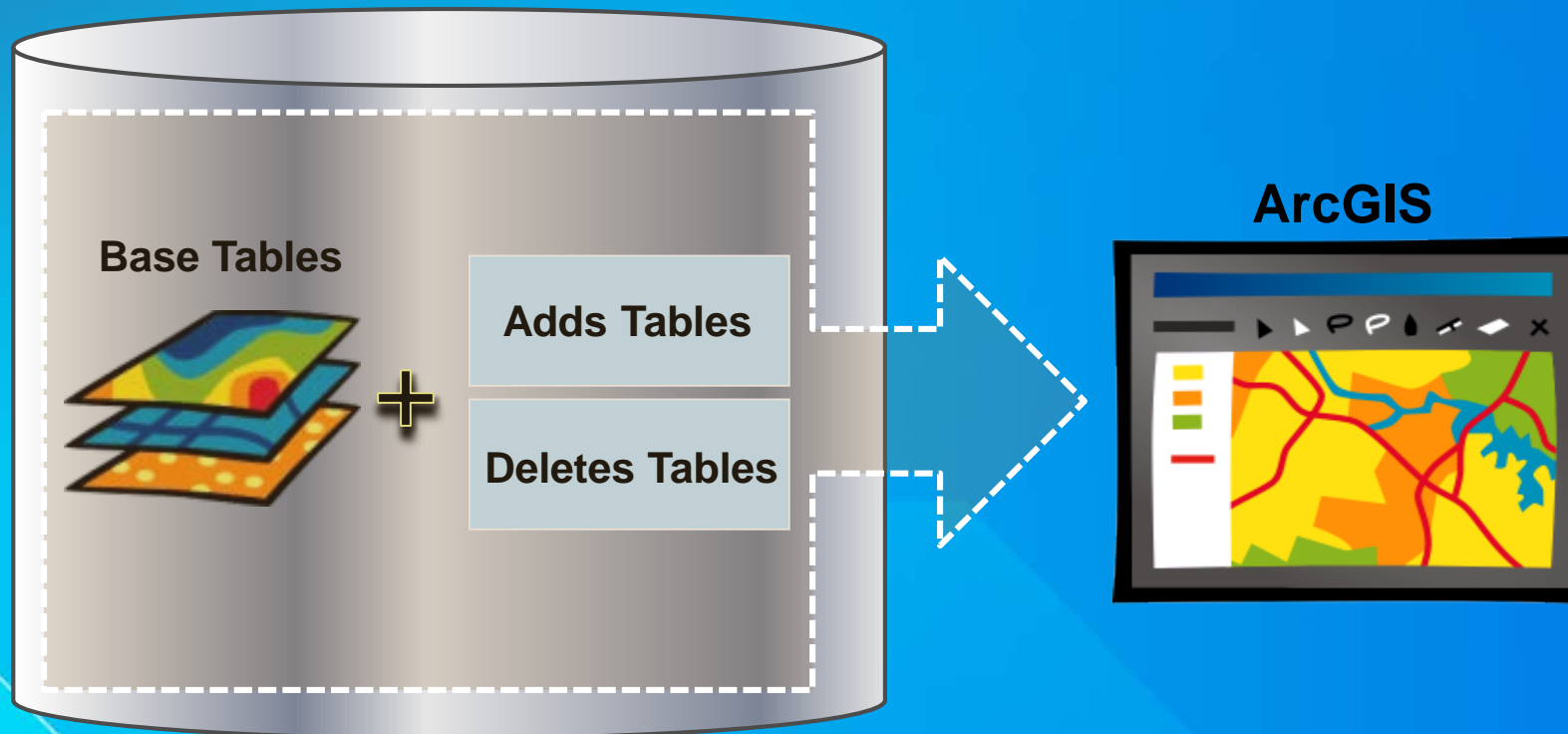
Deletes Table

Deleted_At	Deletes_Row_ID	SDE_State_ID
27506	5	0
27507	2	0

A red arrow points from the row in the Deletes Table (Deleted_At: 27507, Deletes_Row_ID: 2) to the corresponding row in the Adds Table (ObjectID: 2, SDE_State_ID: 27507).

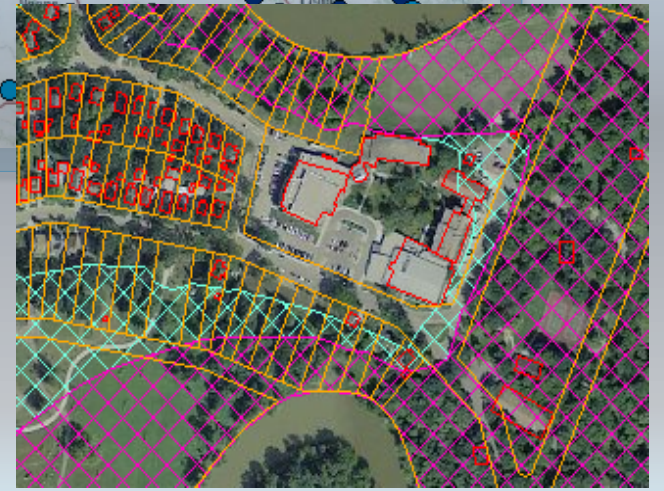
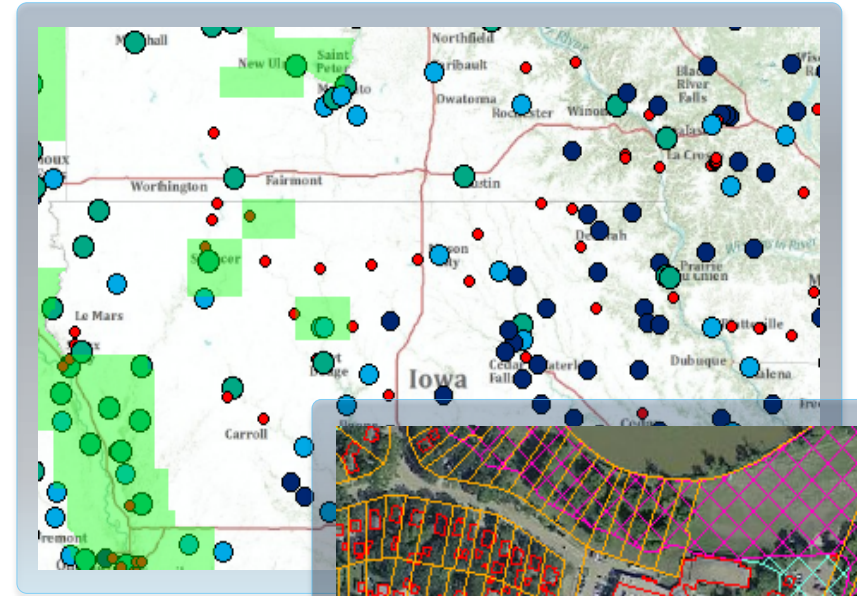
How Versioning Works

- Versioned feature classes:
 - Base Tables, Adds Tables & Deletes Tables



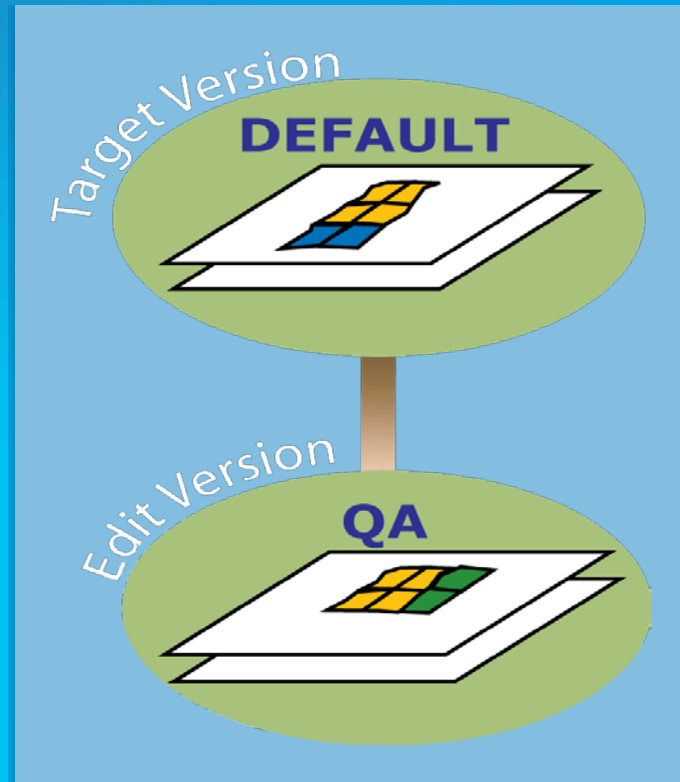
Versioned Editing Demo

Shawn Thorne



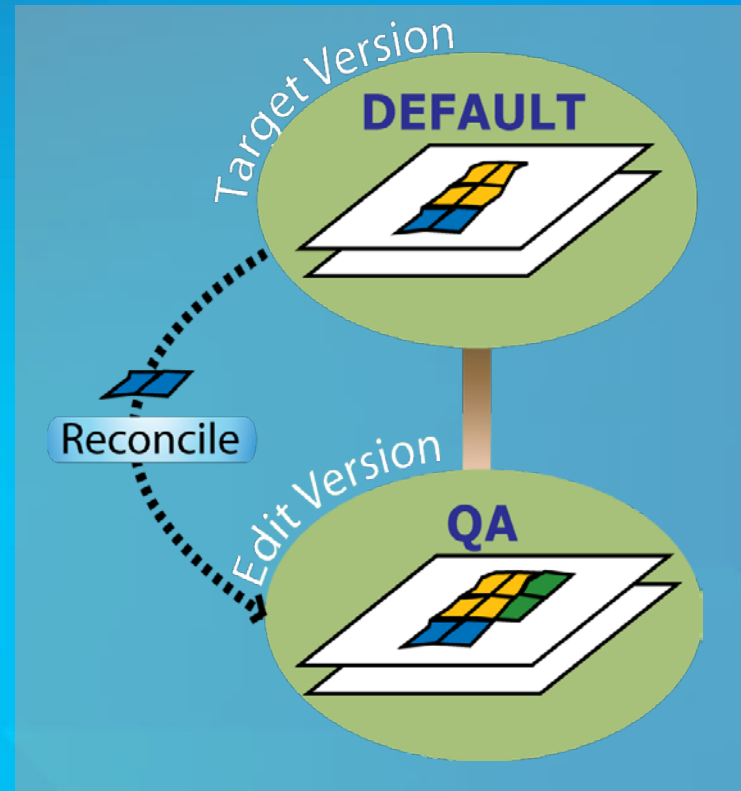
Versioned Editing – Reconcile and Post

- How can versions be merged?



Versioned Editing – Reconcile

- Incorporate changes from the target version



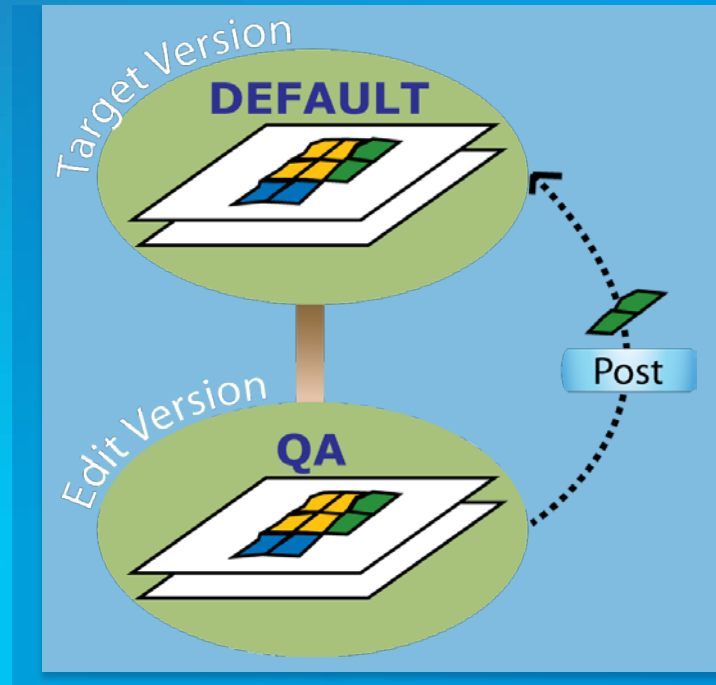
Reconcile and Conflicts

- No locks on edit
 - Data overwritten?
 - Conflict detection
- Conflict Resolution Dialog

Property	Current	Pre-Reconcile	Conflict	Common Anc...
OBJECTID	24267	24267	24267	24267
Riverside_...	2881.37084996	2881.37084996	2881.37084996	2881.37084996
PERIMETER	270.28373985	270.28373985	270.28373985	270.28373985
BLD_DISS_...	24268	24268	24268	24268
BLD_DISS_I	24268	24268	24268	24268
• BLPYTYPE	1	2	1	1
PHASE	<Null>	<Null>	<Null>	<Null>
• Shape				
• SHAPE.area	2370.35933...	2881.37002...	2370.35933...	2881.37002...
• SHAPE.len	213.728725...	270.284107...	213.728725...	270.284107...

Versioned Editing – Post

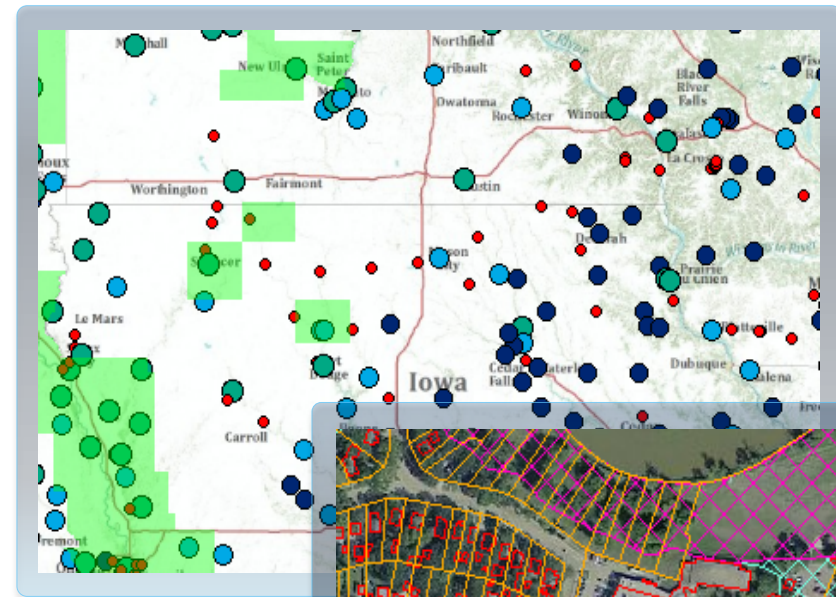
- Incorporate with target version



- After a post versions are identical

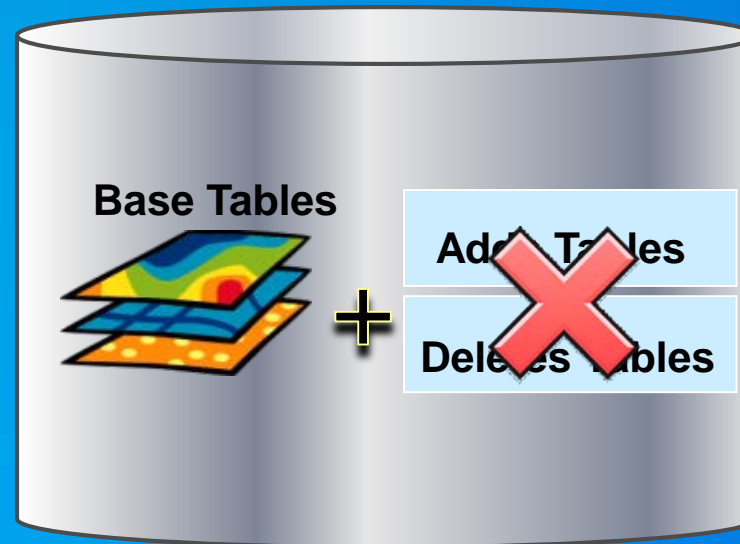
Reconcile & Post Demo

Shawn Thorne

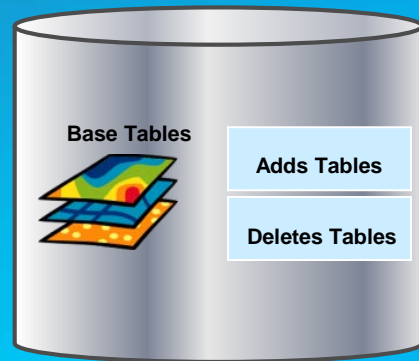


Non-Versioned Editing

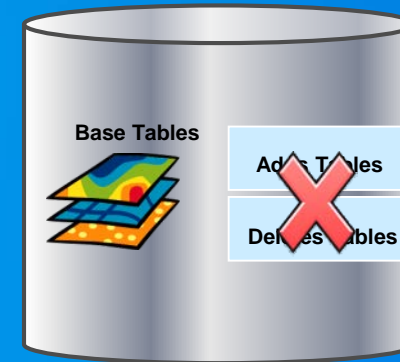
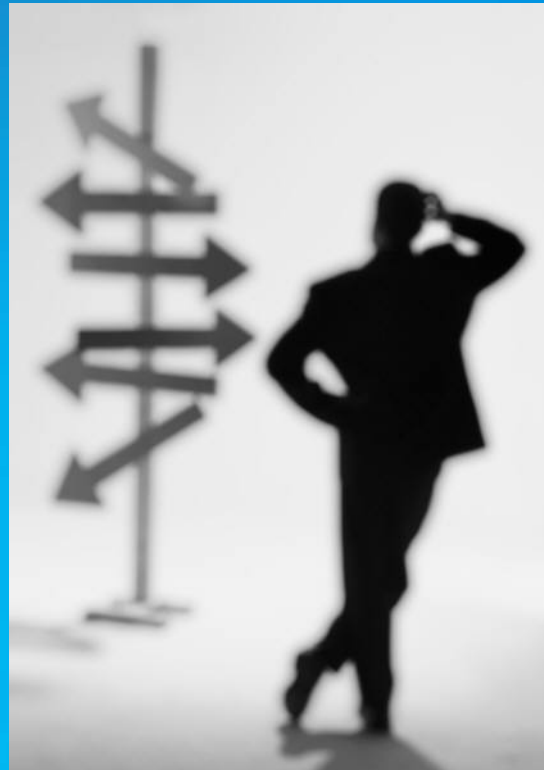
- **Directly editing the base tables**
- **Benefits IT integration**
- **Database integrity rules**
- **Simple data only (Points, Lines, Polygons)**



But I want both...



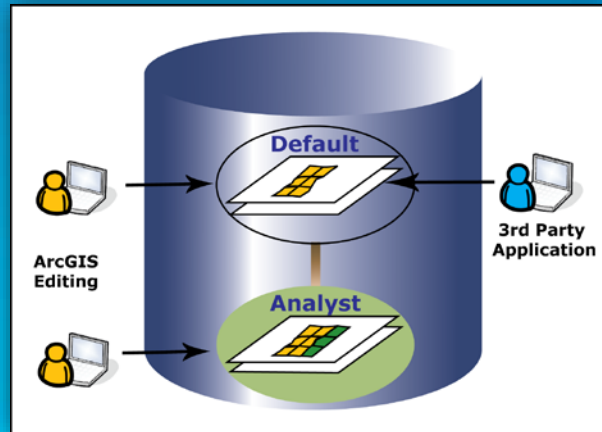
Versioned



Non-versioned

Versioned Editing - Move to Base Option

- **Hybrid**
 - versioned and non-versioned



IT integration

Database constraints

- **Simple data only**
 - Points, lines, polygons, annotation, relationship classes

SQL Editing

- **Attributes**
- **Geometry**
 - **Spatial Types**
 - Non-ArcGIS Client
 - SQL access to geometries
- **Versions**
- **No geodatabase functionality**

Multi-user Geodatabase Editing Summary

- **Three editing strategies**
 1. **Versioned Editing**
 2. **Non-Versioned Editing**
 3. **SQL Editing**
- **Which one do I use?**
- **Depends:**
 - > **Short vs. Long Transactions?**
 - > **non-ArcGIS clients?**
 - > **Multi-editor requirement?**

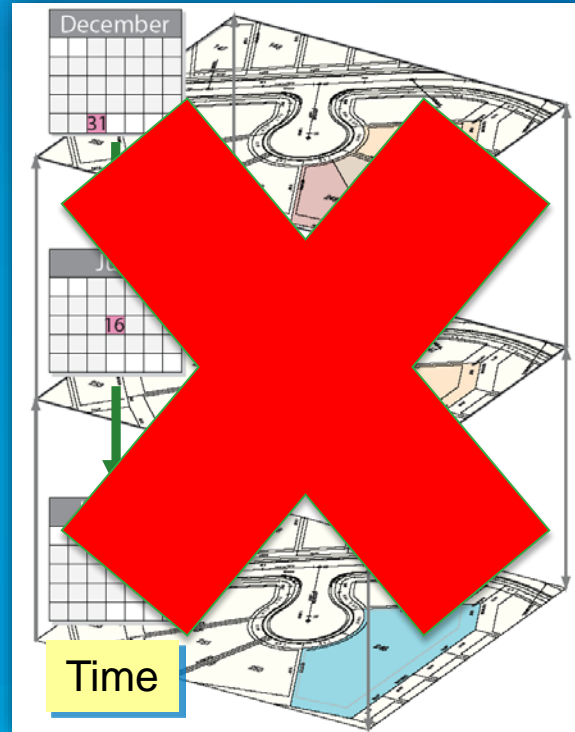
Session Path

- Introduction to the Multi-user Geodatabases
- Versioning
- Multi-user Geodatabase Editing Strategies
- **Archiving**
 - **What is it?**
 - **How is it used?**
- Geodatabase Replication
- Q & A

Geodatabase Archiving: What is it?

- **Edit history**
 - Versioned data
 - Non-versioned data

- **Temporal queries**

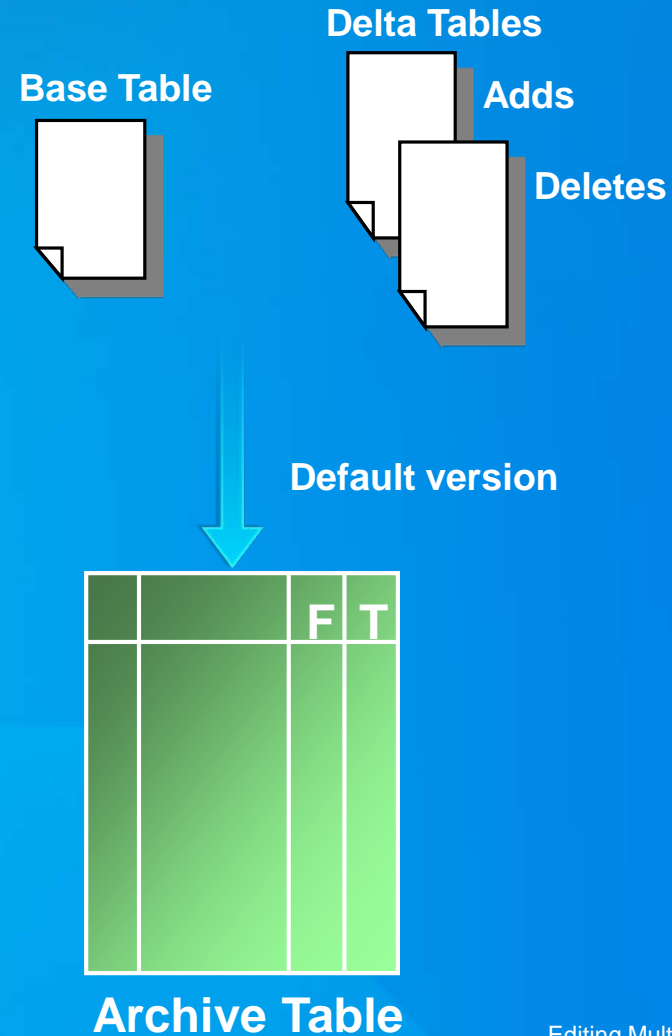


Versioned Archiving: How it works

- Extends versioning

1. Register as Versioned

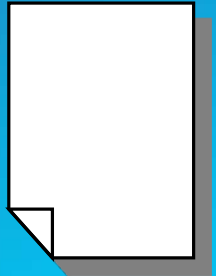
2. Enable Archiving



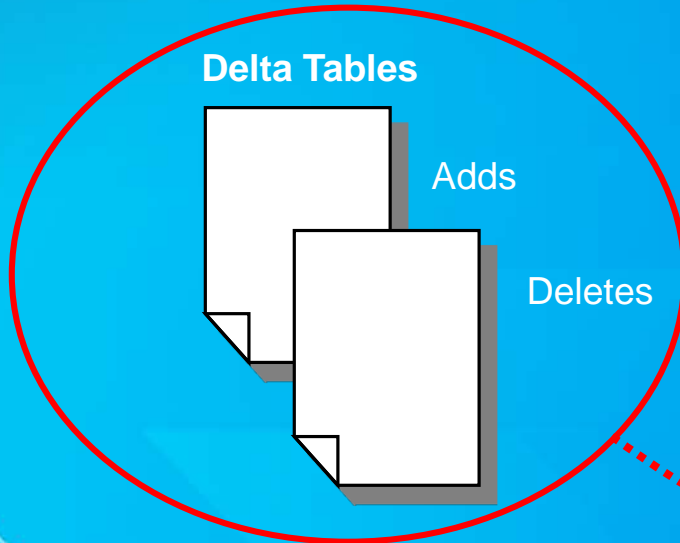
Versioned Archiving: How it works

- Save edits (or Post) on the Default version
 - changes added to archive table

Base Table



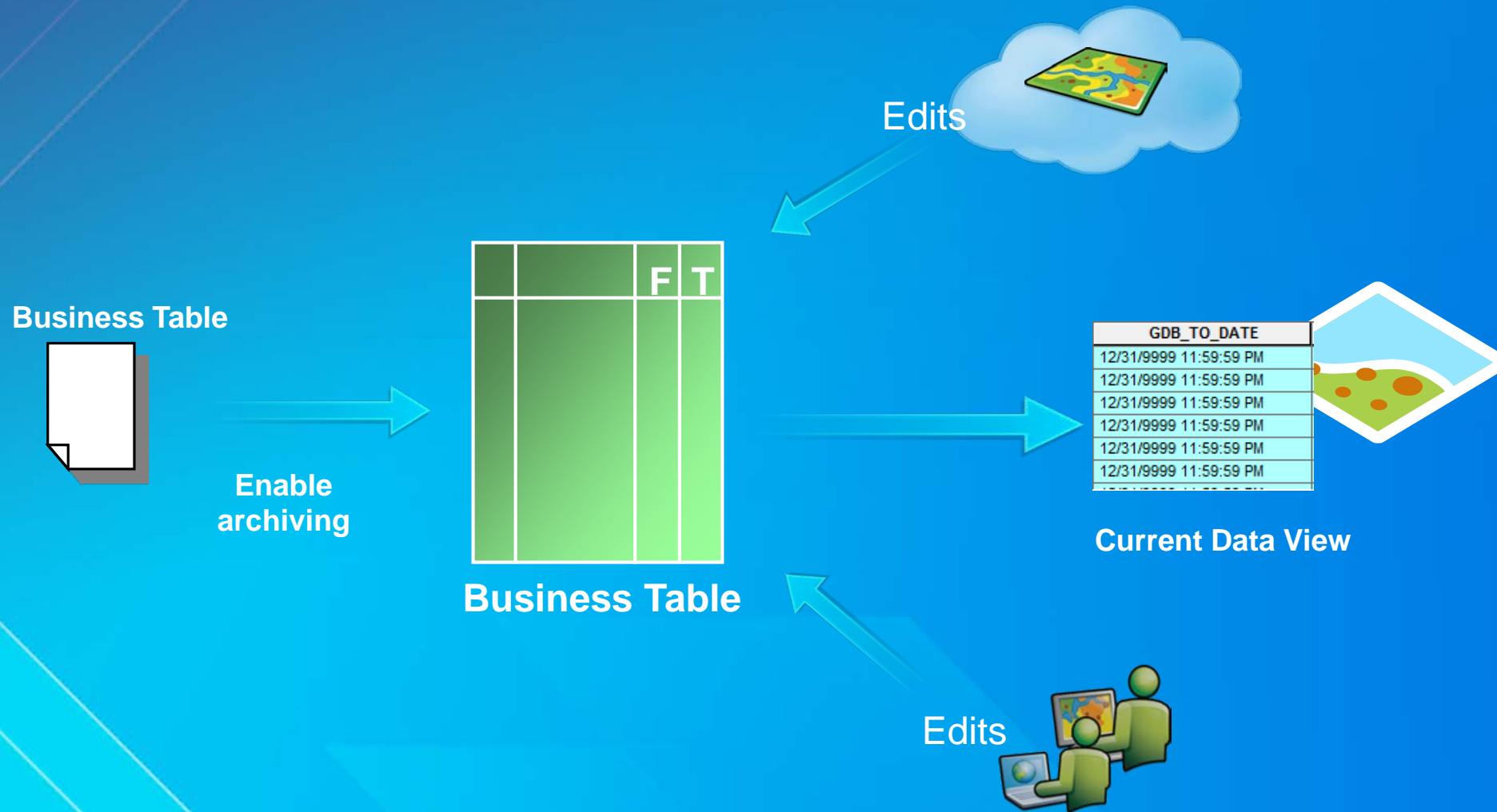
Delta Tables



Archive Table

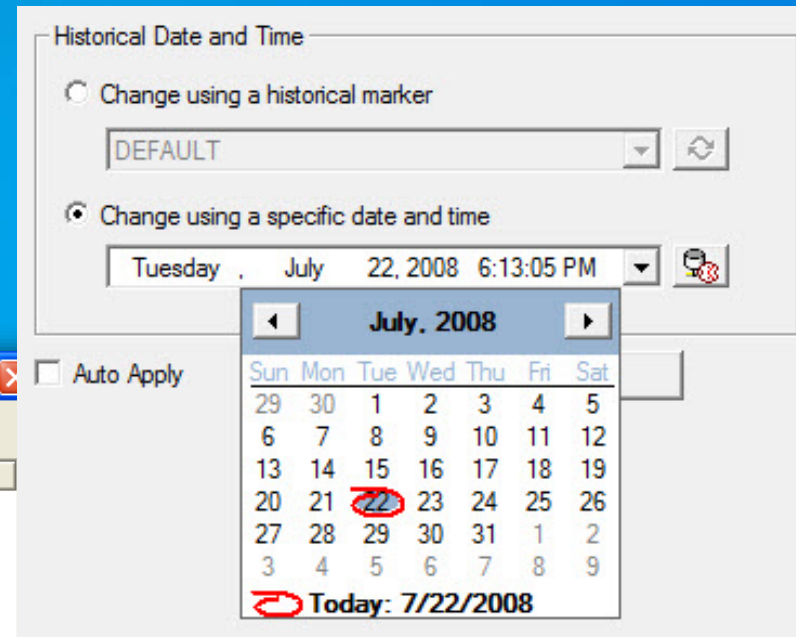
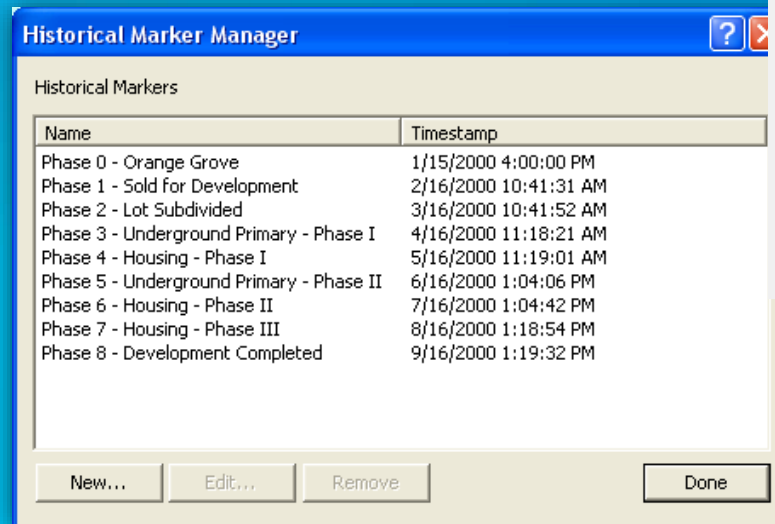
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Non-versioned Archiving: How it works



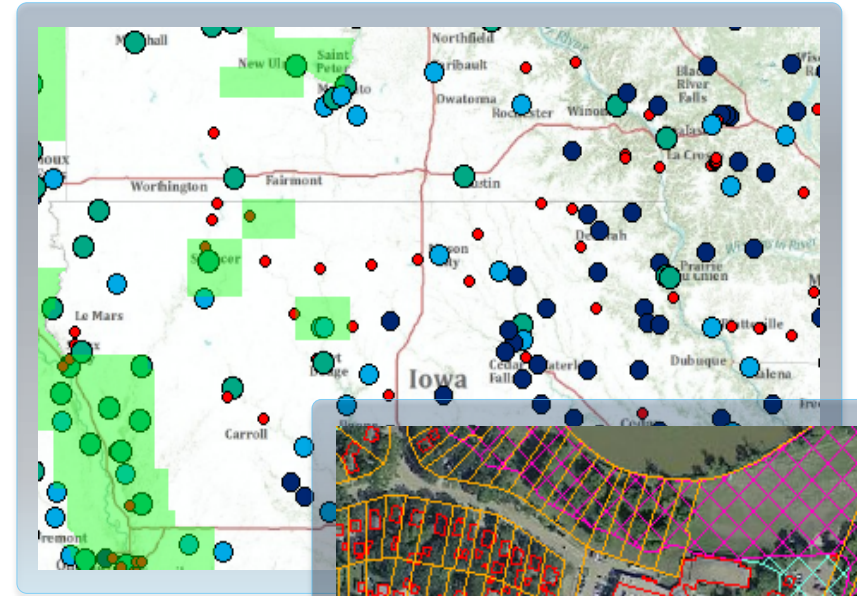
Geodatabase Archiving: usage

- Two query methods
 - specific date and time
 - historical marker



Geodatabase Archiving Demo

Shawn Thorne

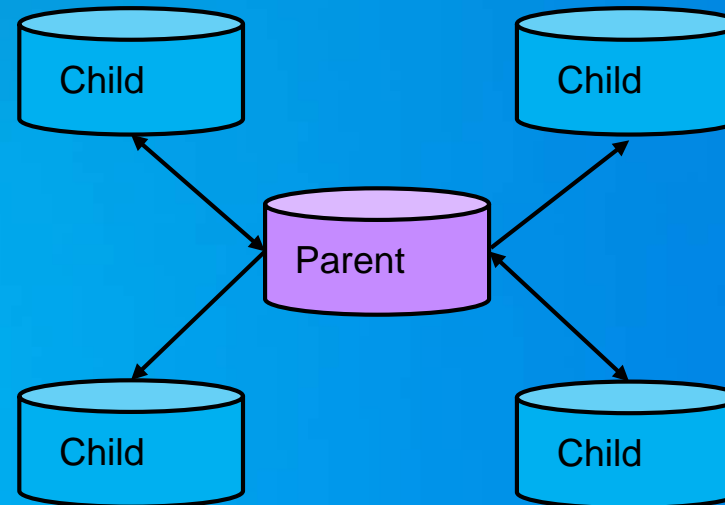


Session Path

- Introduction to Multi-user Geodatabases
- Versioning
- Multi-user Geodatabase Editing Strategies
- Archiving
- **Geodatabase Replication**
- Q & A

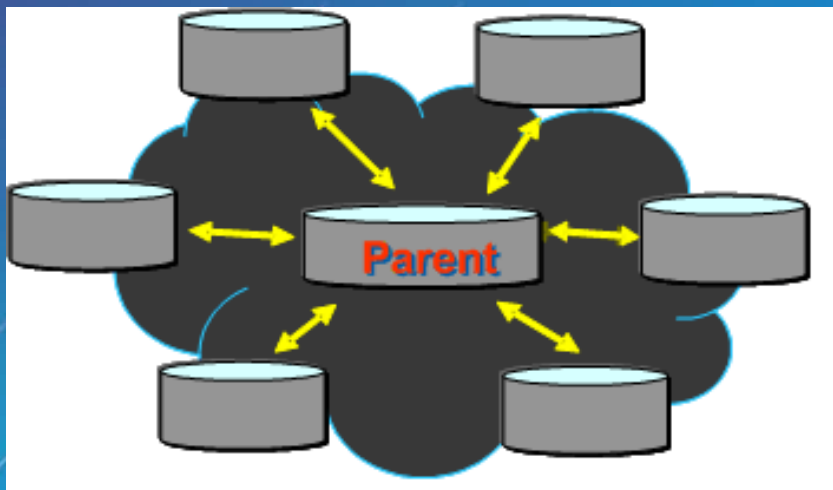
Geodatabase Replication

- **Distribute subsets of data**
 - Platform independent
- **Data edited independently**
 - synchronized when needed

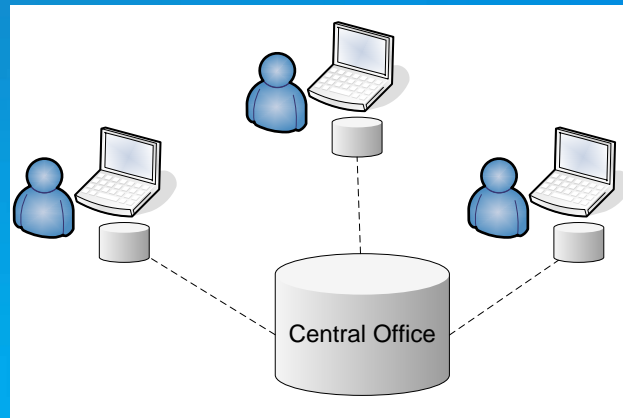


Distributed Geodatabase Use Cases

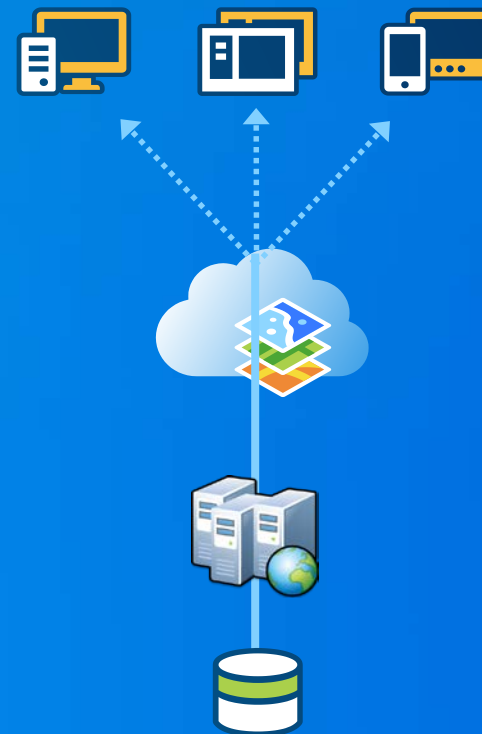
Central Hub



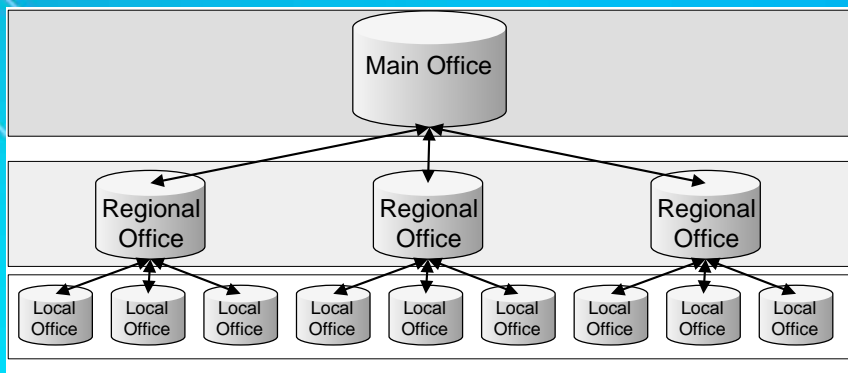
Mobile Users



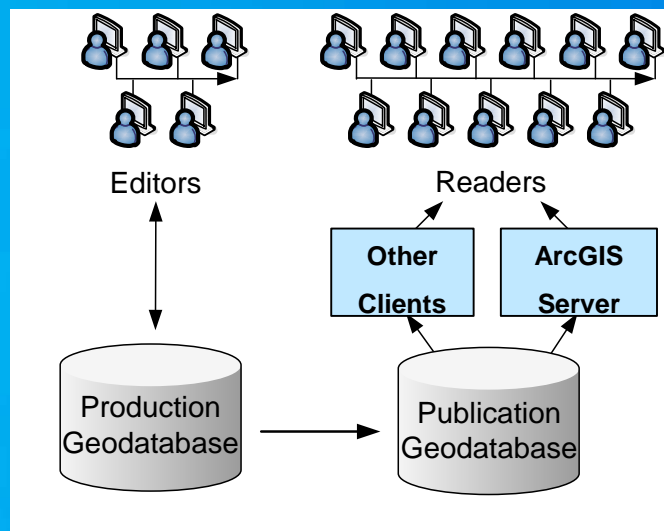
Feature Services with Sync



Multiple levels / Replica Tree

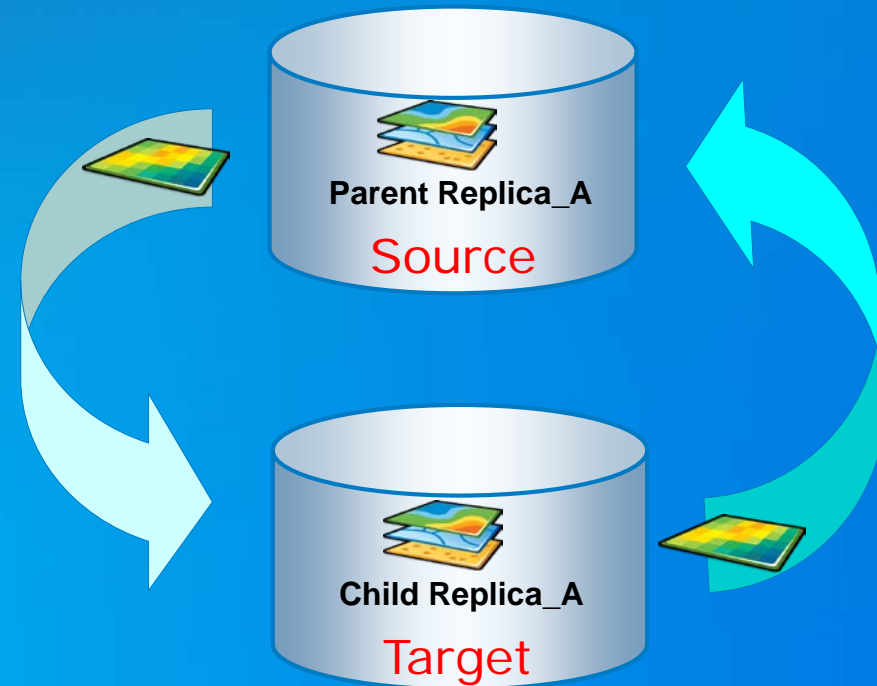


Production / Publication



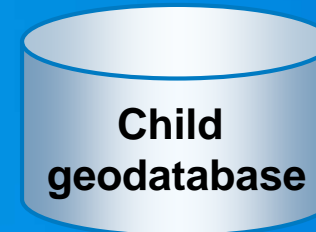
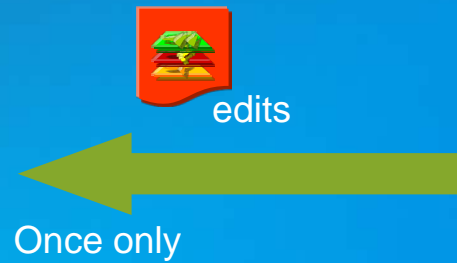
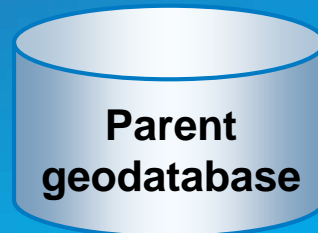
Geodatabase Replication - Concepts

- You can replicate :
 - A specific version
 - Specific datasets
 - A subset of features in the chosen datasets
- Transfer updates

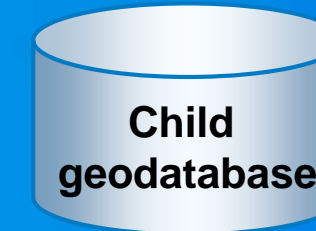
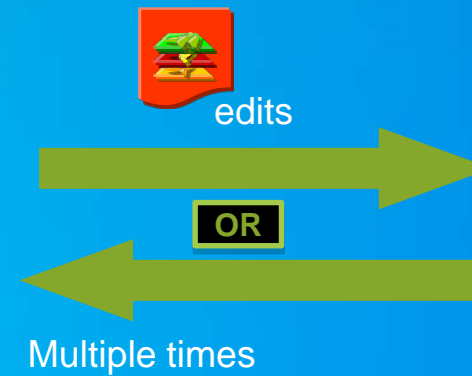
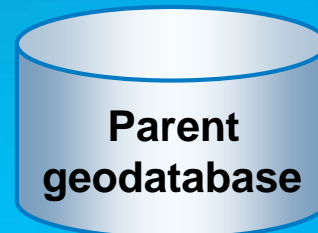


Three Types of Replicas

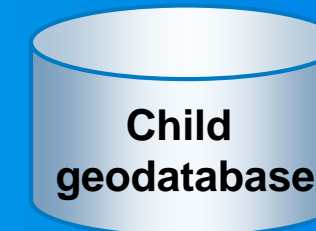
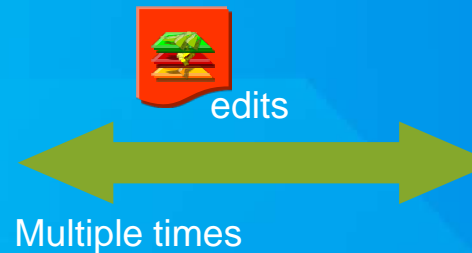
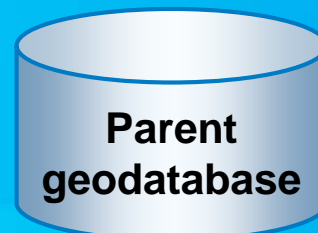
Check out /
Check in



One-way

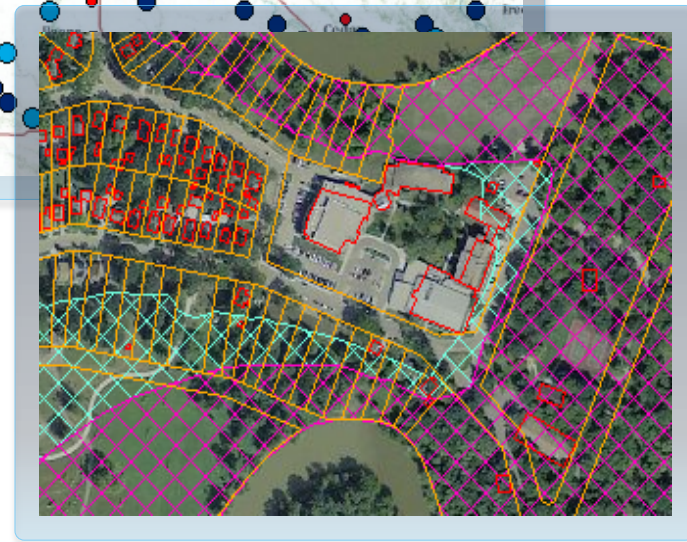
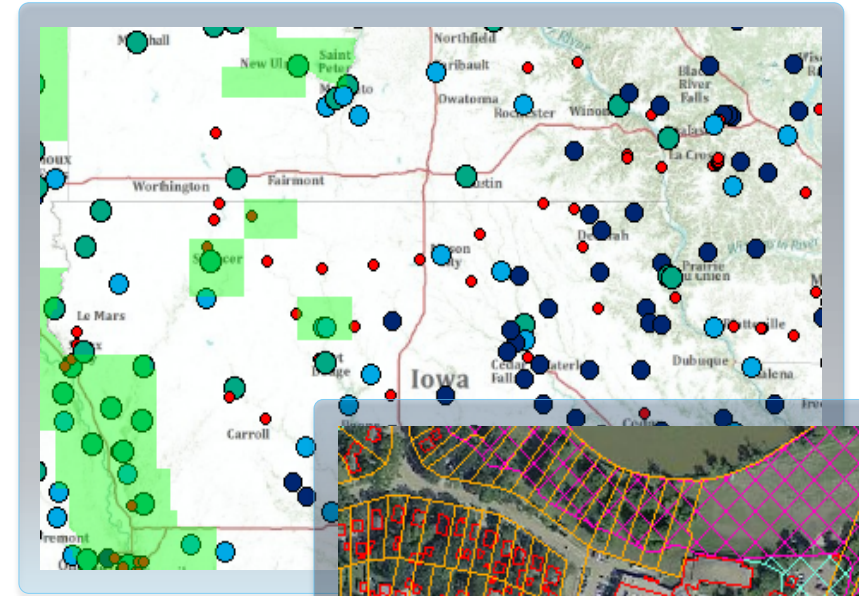


Two-way



Geodatabase Replication Demo

Shawn Thorne



Geodatabase Replication - Summary

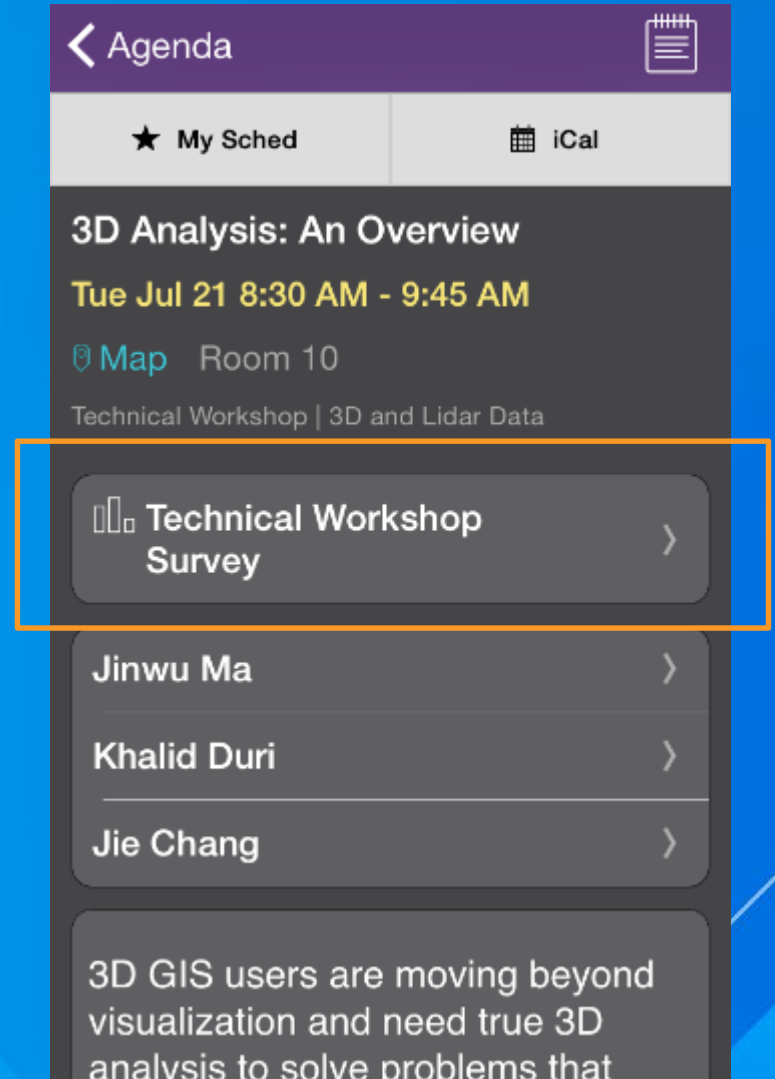
- **Distribute data across Geodatabases**
- **Different Replication workflows**
 - Check out / Check in (Personal, File or multi-user geodatabase)
 - One-way (Personal, File or multi-user geodatabase – parent is multi-user)
 - Two-way (multi-user geodatabases)

Session Path - Summary

- Introduction to the Multi-user Geodatabases
- Versioning
- Multi-user Geodatabase Editing Strategies
- Archiving
- Geodatabase Replication

Thank you...

- Please fill out the session survey in your mobile app
- Select 'Editing Multiuser Geodatabases: An Introduction' in the Mobile App
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Thank you for attending!

Questions??



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