Enterprise Geodatabase Tips and Tricks

Goals:
- Issues common to all ArcSDE technology consumers.
- Avoid RDBMS specific issues (e.g. Only PostgreSQL)

Assumed Knowledge:
- Use of RDBMS tools
- Use of Standard ArcMAP, ArcGIS Server operations

Questions:
- Our database is too slow...
- I can’t add a field to a feature class...
- What is “direct connect”?
- How do I edit and publish maps and avoid locks?
IT Stack
Schema Locks: Tips and Tricks

- Schema Locking depends upon:
  - Geodatabase design best practices
  - Well defined data management workflows
  - Proper Geodatabase architecture

- Lock types
  - Table, Layer, State, Object
  - Table – shared most common – will prevent modification of table or feature class (object) structure, permissions, etc…

- Some methods of working around schema locks
  - Geodatabase Architecture – multiple geodatabases
  - For data synchronization – GP – Delete and Append features
  - For viewing – SDE and RDBMS views
  - ArcGIS Server - SchemaLockingEnabled
Geodatabase Object Management

Tips on Registration and Schema changes

- Adding a field at RDBMS level
  - `column_registry` table
  - owner view w/ArcCatalog or run `sdetable -o describe`

- “Non-Geodatabase” Table Registration
  [Link](http://webhelp.esri.com/arcgisserver/9.3.1/dotNet/index.htm#geodatabases/enhanci-205816615.htm)
  - 3 data management tiers
    - ArcObjects
    - ArcSDE
    - RDBMS
  - Objectid - user/sde managed unique non-null integer field
What **ObjectID** field provides

- **If your table lacks an ObjectID field, you won't be able to**
  - Select the features in the layer on the map in any way.
  - Apply *definition query* to display subset of records/features.
  - Create relates.
  - Start an edit session and edit the attributes.
Design: Log File Recommendations

• 3 Types – Session, Shared and Stand-Alone

• Use default architecture for RDBMS
  - Shared for Oracle (IDs removed upon unselect versus disconnect)
    - Global temporary tables – see ESRI KB article 32161
  - Session for SQL Server

• Use session if multiple users have same login
  - Default for SQL Server (session/tempdb – minimizes logging)
  - Avoids table contention (e.g., many users connecting with a single login)

• Use pool if users are prohibited from creating objects
  - If pool unavailable, ArcSDE will attempt a user-owned table
Design: Geodatabase Architecture

- **Single vs. Multiple Geodatabases**
  - **Uses/Requirements**
    - Vector and Raster, Editing and Publishing, Production and Development, Departmental
    - Performance – use specific tuning
    - Management/Administration (e.g. locking issues)
    - High Availability (HA), Disaster Recovery (DR)
  - **Implementation**
    - Multiple Instances (e.g. Oracle)
    - Multiple Databases or Named Instances (e.g. SQL Server)

- **Data Distribution and Synchronization**
  - Geodatabase Replication
  - Export/Import
  - Database Cloning or Replication
Feature Datasets

• Designed to ensure spatial coincidence
  - **Required** for many types of behavior
    - Geometric networks, topologies, etc...

• Considerations for use
  - All feature classes are instantiated
  - Privileges are granted/revoked for all classes
  - Registering as versioned occurs at dataset level
  - Locks can apply to all feature classes
    - Spatial Views, Separate Editing and Publishing geodatabases, etc… can sometimes help

• **Avoid using for organizational purposes**
Labeling, Symbols, Sub-Queries and Renderers

- **Impact of labeling and symbols**
  - Causes a 2nd SQL query on every layer (feature, then label attribute)
  - Enable Map Cache or use Annotation
  - Try alternative symbology types
    - E.g. Graduated color vs graduated symbol

- **Impact of Sub-Queries**
  - Can reduce amount of information returned by filtering attributes
  - Can cause extra load on the database if columns not indexed

- **Impact of Renderer**
  - More complexity in rendering and symbology increase CPU load, especially in Citrix/Terminal server architectures.
  - Switch to more appropriate renderers.
Tools and Tips for Map Documents

- map document performance analysis tool at 9.3.1
- New .msd document @ 9.3.1
  - Map Service Definition file for 9.3.1 ArcGIS Server fast drawing engine
- Basemap Layer @ 10.x
  uses a combination of in-memory and disk caches. Limit your map to less than 5 basemap layers as possible to limit memory consumption
- MxdPerfStat (arcscripts.esri.com)

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<th>At Scale</th>
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<th>Recommendations</th>
<th>Features</th>
<th>Vertices</th>
<th>Labeling</th>
<th>Geophony Phase (sec)</th>
<th>Graphics Phase (sec)</th>
<th>Cursor Phase (sec)</th>
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<td>95</td>
<td>Oracle</td>
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ArcMap best practices for users

- **Avoid full display**
  - ArcMap magnifier and overview windows
  - Scale dependencies
  - Use spatial bookmarks
- **Set selectable layers**
- **Keep table of contents and symbology simple**
- **Use keep only matching records option with joins**
- **Use feature (10.x)/map cache (9.x)**
- **Use basemap layer @ 10 and display cache**
Caching Tips

• ArcGIS Desktop Feature/Map Cache
• Display Cache
• ArcGIS Server Map Cache

ArcGIS Desktop Feature/Map Cache

- Client side caching over given spatial extent
- Can speed up queries
  - Reduces roundtrips to the database
- When to use?
  - If making many spatial queries within a common extent
  - If working with several features within a certain geographic area.
  - When editing non-simple Geodatabase features, e.g. Geometric Networks
  - When editing and snapping enabled. Each snap requires a round-trip(s) to the database unless there is a cache
- Do NOT use for non-versioned editing (short-transaction)
ArcGIS Server Map Cache

- Tiles pre-rendered at fixed scales
- Rapid display – fast map display engine (msd)
- Improved performance AND scalability for Geodatabase
  - Helps to reduce SQL activity
Versioned Editing Performance

• Performance affected by:
  - Volume of states
  - Stale statistics
  - Unnecessary versions*
  - Proper workflow

• Manage your version
  - Reconcile
  - Post
  - Compress

• Replication also based on versioning
Automation of Reconcile / Post

- KB36809: Report the recommended reconcile order using SQL in SQL Server
- KB35735: Report the recommended reconcile order using SQL in Oracle
- Use GP Tools and script to python