Enterprise Geodatabase: Topics in Microsoft SQL Server Administration

Chet Dobbins & Shannon Shields

SEE WHAT OTHERS CAN'T

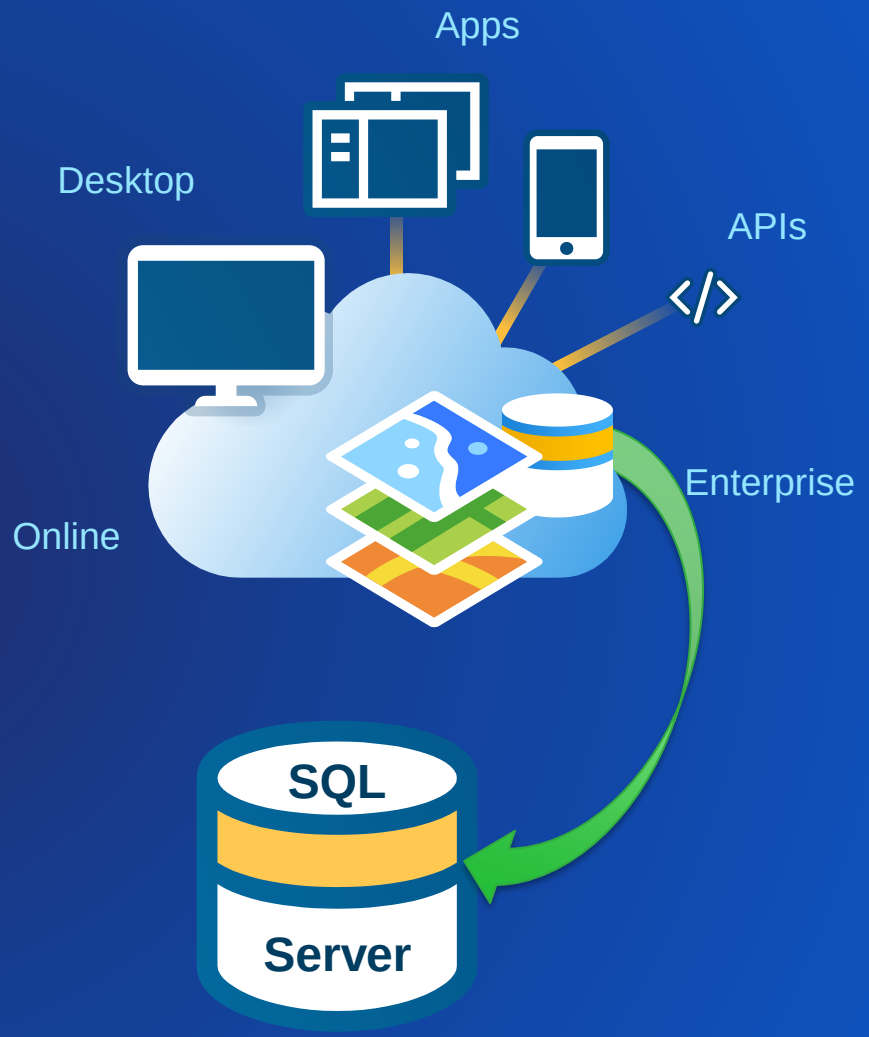
Intended Audience

You are…..

- A geodatabase administrator
- A SQL Server DBA

And you…

- Store your enterprise geodatabase in a SQL Server database



Agenda

- Configuring SQL Server for enterprise geodatabases
- Managing and maintaining database security
- Storing and managing spatial data
- Achieving optimal performance

- News since the last UC

Configuring SQL Server for enterprise geodatabases

Installing & configuring SQL Server

- Install a supported version of SQL Server
- Use a Case-Insensitive (CI) collation
- Windows or Mixed-mode authentication
- SQL Server Browser is not required
  - Must provide static TCP port on connection

…more configuration recommendations

- Do not check Boost SQL Server Priority or Enable Windows Fibers
- Set a realistic maximum server memory
- Set the Network Packet Size = 8192
  - Depends on network infrastructure

- Information on memory pressure errors

Tempdb

- System database
  - Temporary space for **entire** SQL Server instance
- Stores
  - Temporary objects, sorting space for joins
  - ArcGIS connection handle, log file tables, read committed snapshot version stores, keyset cursors, etc…
- Recommendations
  - dedicated drive
  - multiple files (1 per core for 1st 8 cores)
  - pre-size the files (make them big enough so no auto-growth)

tempdb

Demo

Connecting to SQL Server from ArcGIS

- Requires a Microsoft stand-alone DLL
  - Microsoft ODBC Driver for SQL Server
  - Several versions
- Install on every single client
- Must be same or newer version than SQL Server

Creating Geodatabases

Create Enterprise Geodatabase	Enable Enterprise Geodatabase
Fast & simple, but…	Requires more planning, but…
requires sysadmin	needs less permissions
default database file sizes & locations (500MB/125MB)	control over database file sizes & locations

- SDE or DBO
  - Choose the user and schema best suited to your system and chosen security model. Comparison of geodatabase owners.
- **Do not rename a database that contains a geodatabase….yet**

Upgrading a geodatabase

- Requires DBO, sysadmin or db_owner
- When upgrading (ArcGIS, geodatabases, and SQL Server)
  - One at a time, step by step, incremental testing
  - Upgrading SQL Server does not upgrade database compatibility level

SQL Server must be at supported release for geodatabase AND ArcGIS clients

Cloud DaaS (Database as a Service)

- Amazon RDS & Azure SQL Database
- Create new geodatabase via CloudBuilder
- Deploy existing geodatabase
  - Amazon – restore .bak file from Amazon S3
    - Sde-schema database only
  - Azure – Data Migration Assistant or import BACPAC file
    - Geodatabase must be 10.6 or higher

Managing & maintaining database security

SQL Server Principals

- Logins = Authentication
  - Who is connecting?
- Users = Authorization
  - What can this person do in the database?
- Schemas = Containers
  - What are logical groups of database objects that should be managed as a whole?

User-schema relationship

- For users that create data, ArcGIS requires that
  - user name = default schema name
    - Not a SQL Server rule
- Users that are DBO all create data in the DBO schema
- Data readers & editors do not need a same-named schema

Who is DBO?

Sysadmin fixed-server role members	Database owner	*Db_owner* role members
• DBO in every database	• DBO in single database	• *NOT* DBO • have DBO-like permissions

Managing Users & Permissions

Demo

Points to remember

- ArcGIS tools manage permissions on all parts of a feature class
- Creating a user with the Create User tool will grant permissions sufficient for creating data
- Active Directory Groups…..not for data ownership

Backups are also part of a security strategy

- Backups are the only way to reliably protect your data
  1. How much time/data can you afford to lose?
  2. Create restore plan that will achieve #1
  3. Create backup plan that supports #2
  4. Implement your plans
  5. Test your recovery plan regularly by using real backup media to restore to a system capable of being used in production

Storing and managing spatial data

SQL Server Spatial data

Geometry

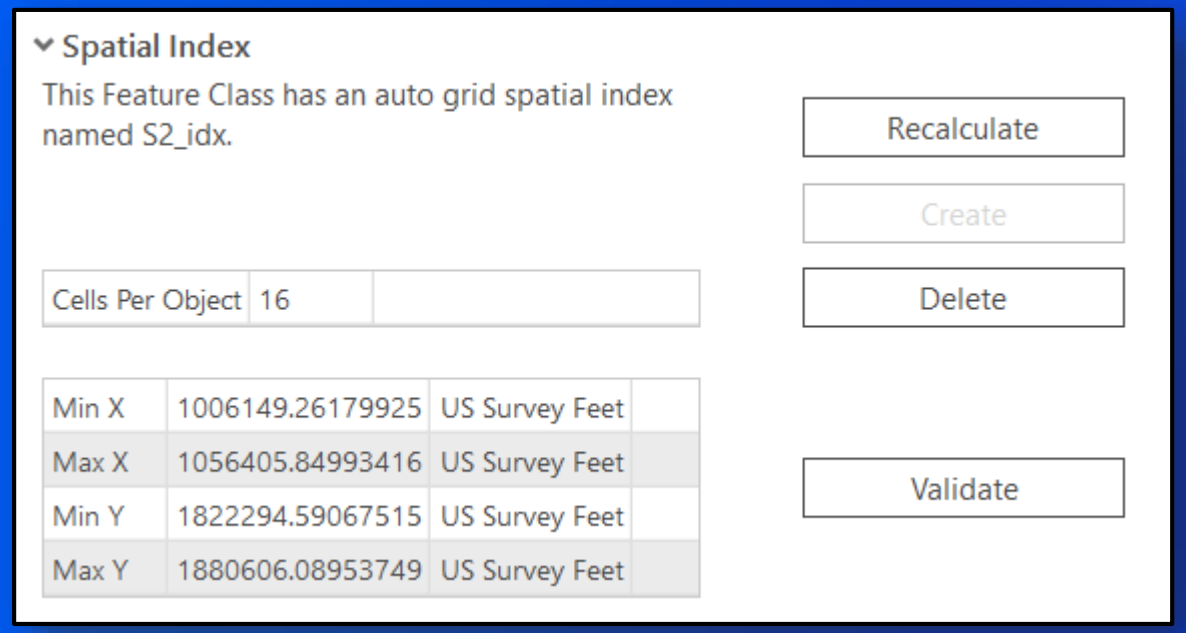
- Coordinate system is not required but can be projected or geographic
- Calculations are planar

Geography

- Only geographic coordinate systems defined in the sys.spatial_references_system table.
- Uses Great Elliptic line interpolation for spatial methods.

SQL Server Spatial Index

- SQL Server requires the table to have a clustered primary key.
  - ArcGIS creates this by default.
- ArcGIS builds a spatial index using SQL Server defaults.
  - Bounding box is set to the extent of the data, or the coordinate system reference if the table is empty
- Geography does not use a bounding box.



Spatial indexes

Demo

Achieving optimal performance

Good performance starts with good design

- Only store what you need to
  - Don’t use big fields for small values
    - 256 characters <> nvarchar(max)
- Only ask for what you need
  - Don’t query for fields you don’t need to see
- Add appropriate indexes
  - Joins
  - Frequently queried columns
- Feature datasets are not like folders
  - Control spatial relationships: networks, topologies etc

How do I maintain good performance?

- Standard maintenance
  - Traditional versioning – state lineage maintenance
  - Index fragmentation
  - Stale statistics
- Spatial data performance - Spatial Index
  - Is it being used?
- SQL Server
  - Monthly updates – apply them!

Index fragmentation

Demo

News

ArcGIS and Microsoft changes since last year

What's new in ArcGIS

SQL Server 2019

Linux

- OSA connections to SQL Server from ArcGIS

Feature Binning

- Applies to:
  - ArcGIS 10.7.0 and 10.7.1
  - Pro 2.3 and 2.4

Supported SQL Server versions

	10.3.x	10.4.x	10.5.x	10.6.x	10.7.x
2008/2008 R2					
2012					
2014					
2016					
2017					
2019				?	

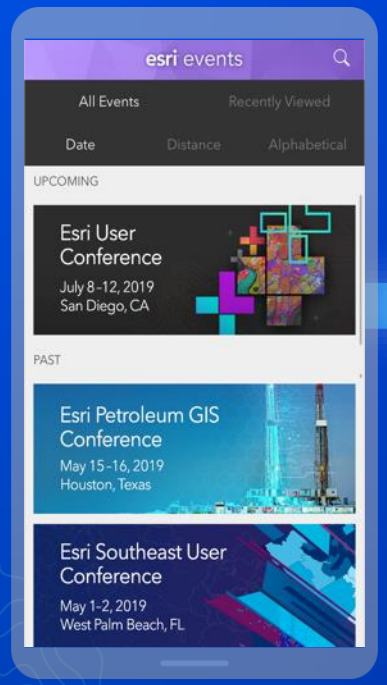
Product Life Cycles

See Us Here

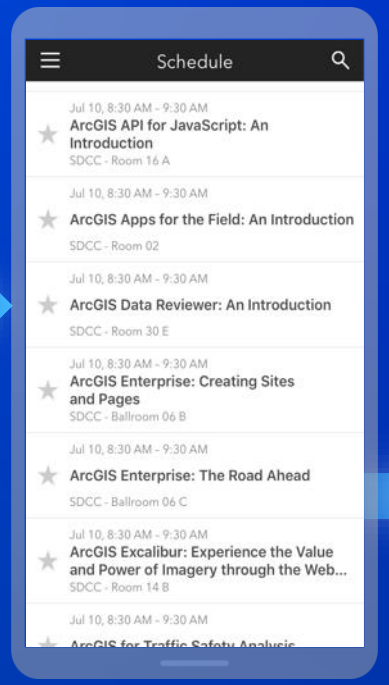
WORKSHOP	LOCATION	TIME FRAME
• Enterprise Geodatabase: Introduction to Multi-User Geodatabases	• SDCC - Room 05 B SDCC - Room 14 A	• Tuesday 10:00-11:00 Wednesday 10:00-11:00
• Enterprise Geodatabase: Performance Troubleshooting	• SDCC - Room 16 A SDCC - Room 09	• Tuesday 1:00-2:00 Thursday 1:00-2:00
• Enterprise Geodatabase: Introduction to Multi-User Editing	• SDCC - Room 30 D SDCC - Room 30 E	• Tuesday 4:00-:500 Wednesday 1:00-2:00
• Enterprise Geodatabase: Automating Administration Tasks Using Python	• SDCC - Demo Theatre 4 SDCC - Demo Theatre 4	• Tuesday 4:00-4:45 Thursday 10:00-10:45
• Distributing Your Data: Workflows and Best Practices	• SDCC - Room 6 C	• Thursday 1:00-2:00
• Visualization & Exploration of Large Datasets Using Feature Binning	• SDCC - Room 16 B	• Thursday 4:00-5:00
• Geodatabase: Ensuring Data Quality with Attribute Rules and Contingent Values	• SDCC – Room 31 B/C SDCC – Room 6 E	• Tuesday 1:00-2:00 Thursday 4:00-5:00

Please Share Your Feedback in the App

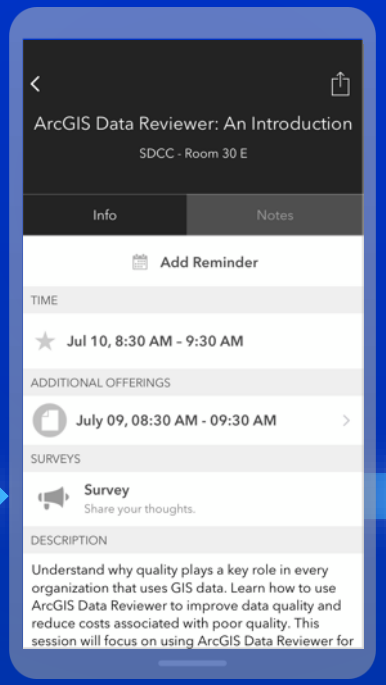
Download the Esri Events app and find your event



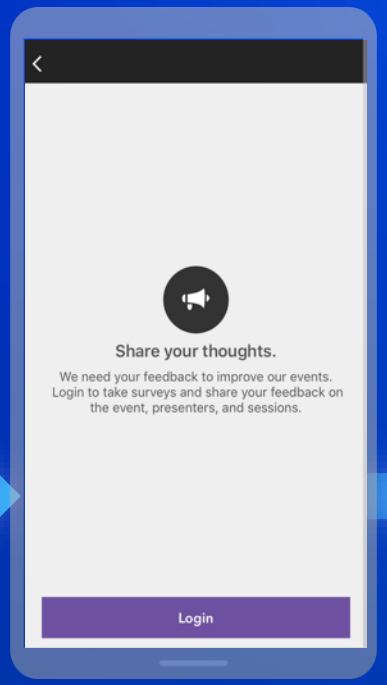
Select the session you attended



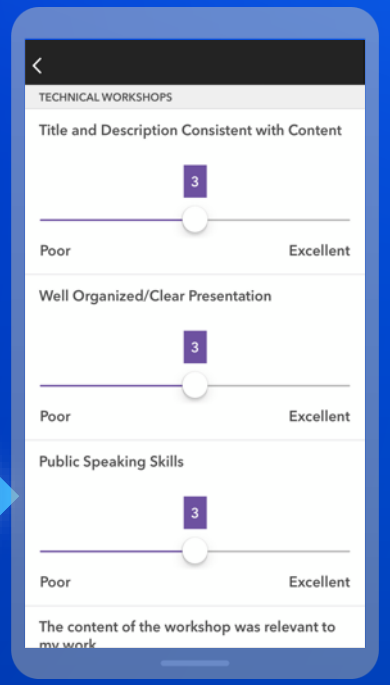
Scroll down to "Survey"



Log in to access the survey



Complete the survey and select "Submit"



Thank you

Questions?


esri
THE
SCIENCE
OF
WHERE