Geodatabase Programming with Python

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Target Audience: Assumptions

- Basic knowledge of Python
- Basic knowledge of Enterprise Geodatabase and workflows
  - Demos of How more than the Why
- Code

- Please silence cell phones

Session Roadmap

Part1: What is the geodatabase

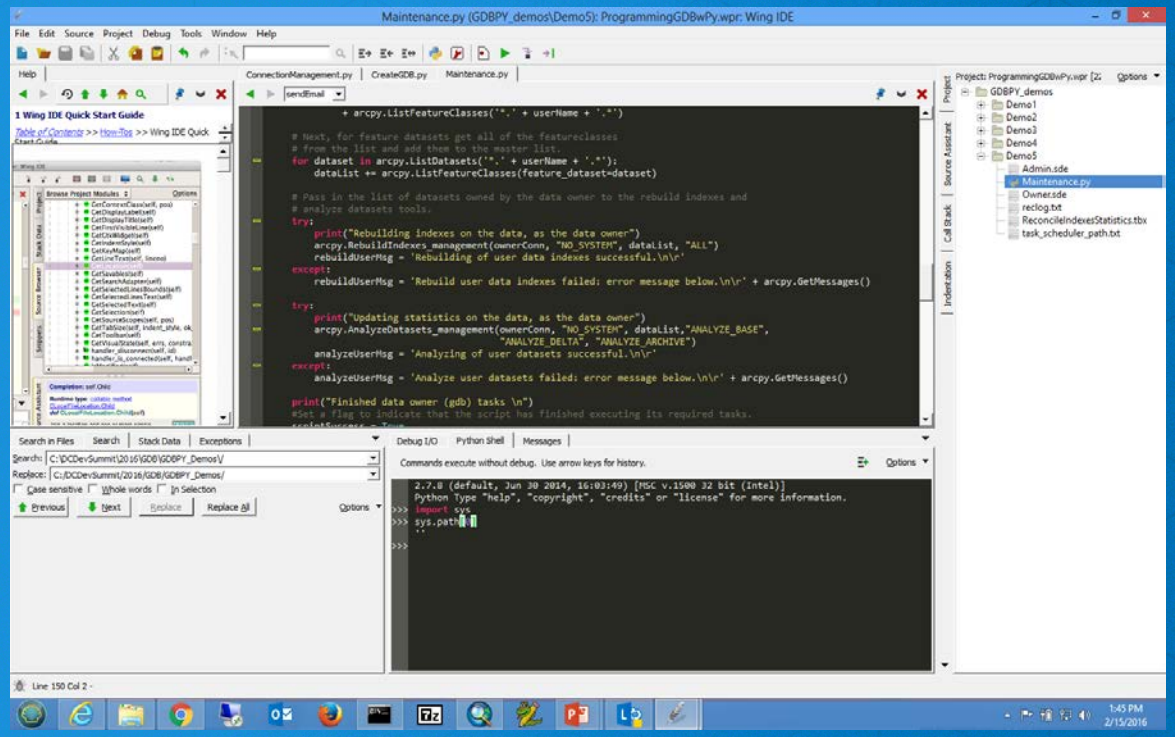
Part2: Geodatabase Creation

Part3: Version Management

- Demos throughout

Why Python

- Free
- Simple and easy to learn
- Easy to maintain
- Wide-acceptance
- Modular
- Cross platform
- Scheduling



What is the Geodatabase

- A physical store of geographic data
  - Scalable storage model supported on different platforms
- Core ArcGIS Information Model
  - Comprehensive GIS Data model for real-world features
  - Implemented as a series of simple tables
- Transactional model for managing GIS workflows
- Set of components for accessing data

Geodatabase System Tables

Store:

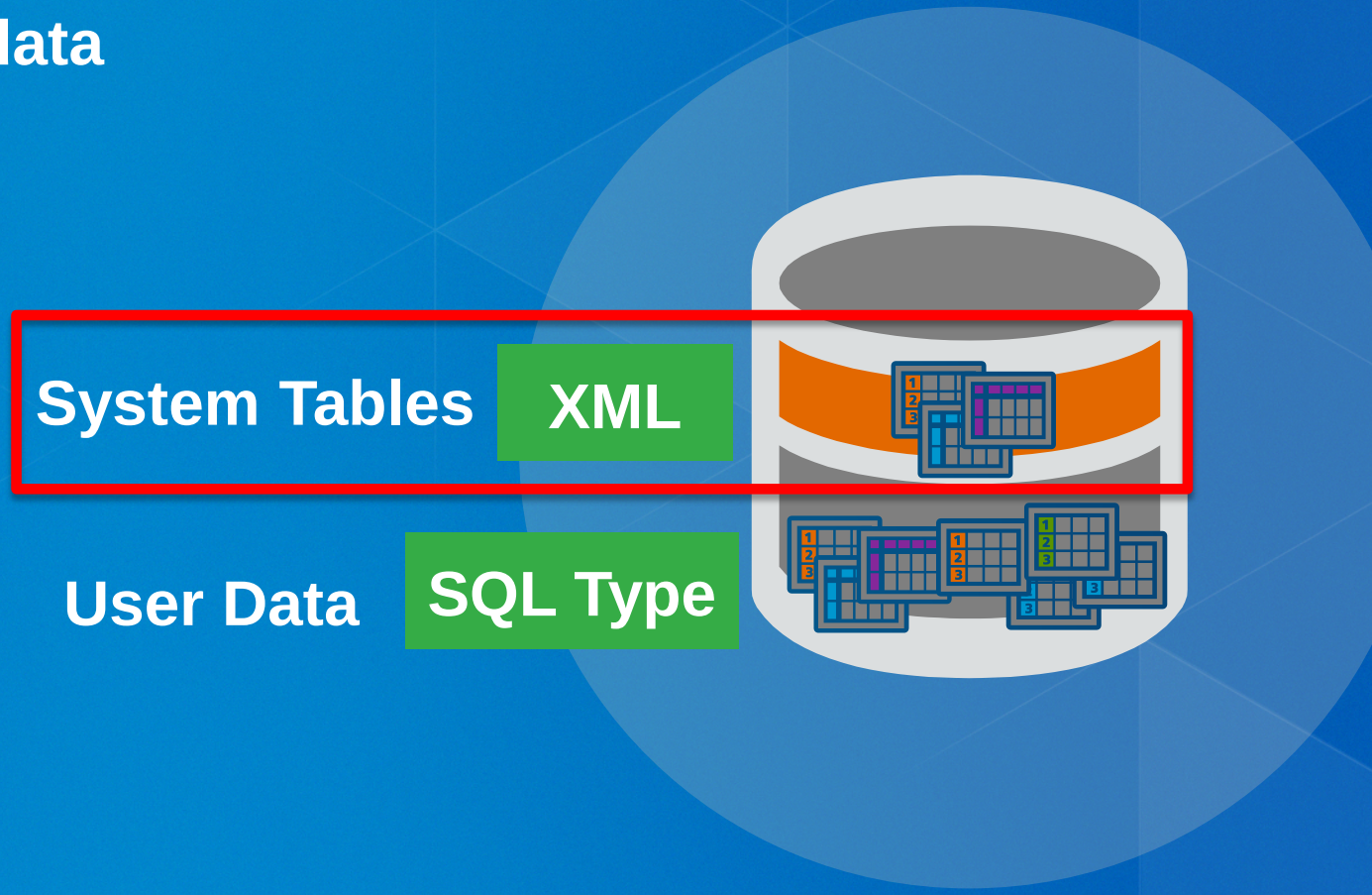
- Definitions, rules, behaviors for datasets
- Some database level metadata
- Versions, domains, etc.

Track:

- Geodatabase contents

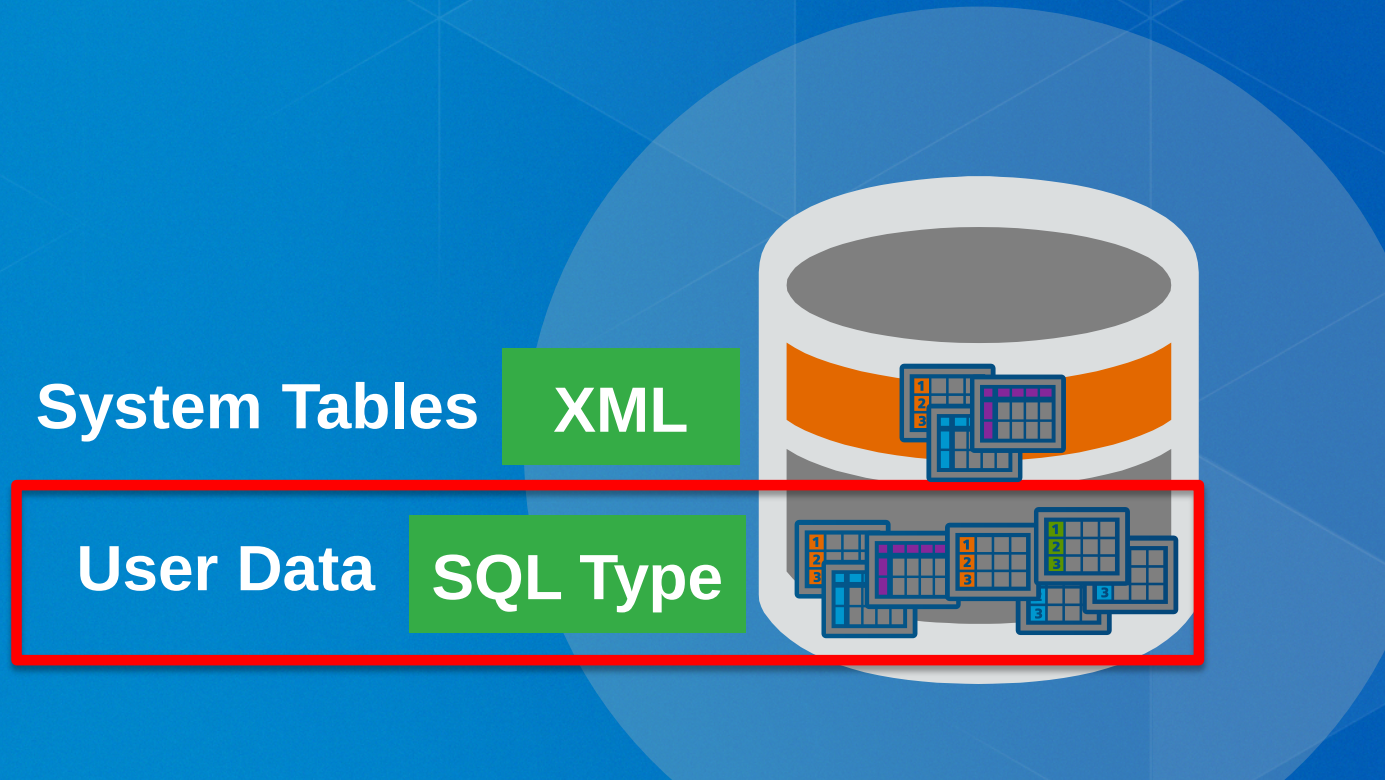
Administer:

- Version management
- Connection management
- Geodatabase upgrade



User-defined Tables

- **Store:**
  - Content of each dataset in one or more tables
- **Administer:**
  - Grant/revoke privileges
  - Update statistics/indexes
  - Register as versioned
  - Add global ids
  - Enable editor tracking



Types of Administrators

- Database Administrator
- Geodatabase Administrator
- Data owner (dataset administrator)

  - Depends on your organization as to whether They are all different people

Types of Administrators

Database

- Database Administrator (DBA)
- Instance level administration

Types of Administrators

Geodatabase

- Geodatabase Administrator
- Owns the geodatabase repository

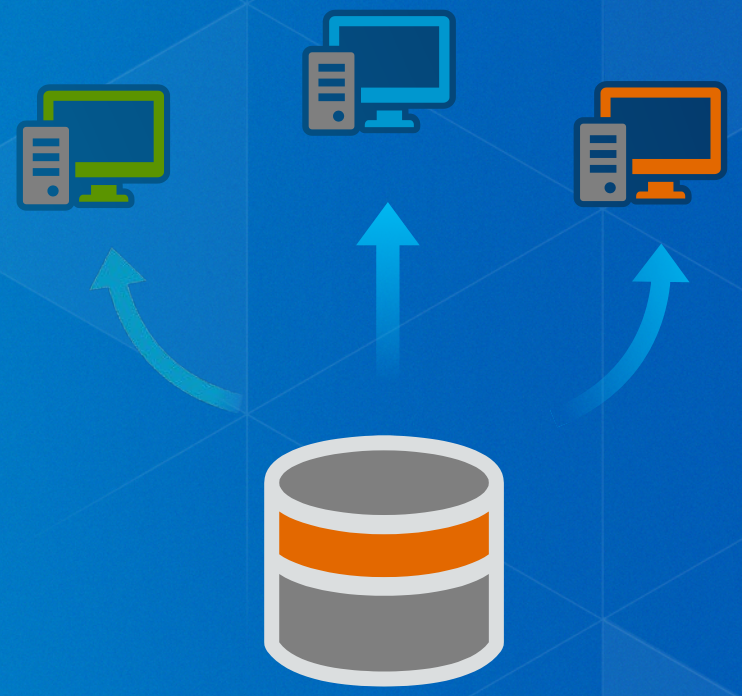
Types of Administrators

Data owner

- Dataset administrator
  - Granting privileges to data
  - Modifying schema of data
  - Database statistics and index maintenance

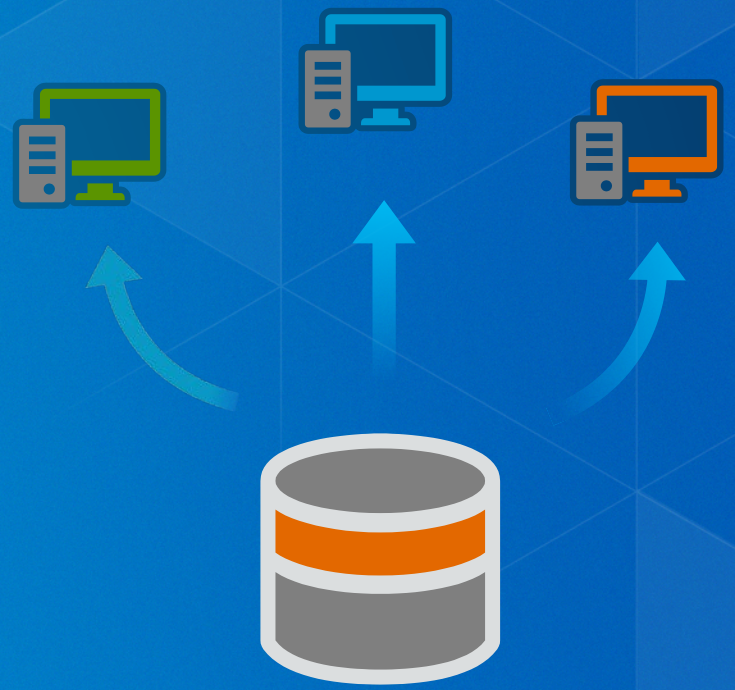
Connections

- Connection file necessary to access enterprise geodatabase
- Control of how you connect to geodatabase
- What user is connected
  - Creating Data
  - Schema changes
  - Administering the geodatabase
- Instance/Database you connect to
- Version, historical archive, or moment in time
- Changing properties requires new connection files



Connection Tools

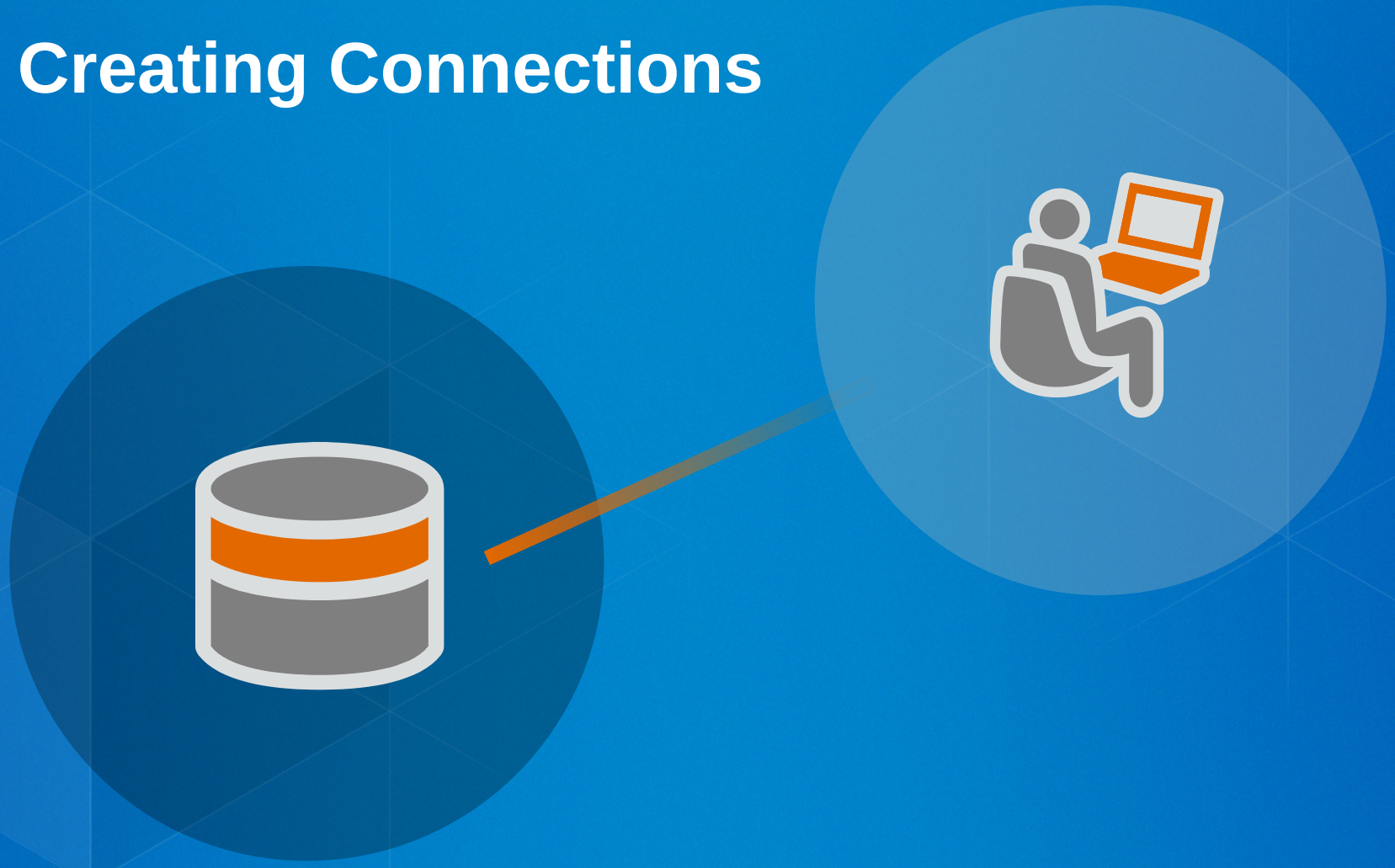
- **Create Database Connection:** `arcpy.CreateDatabaseConnection_management`
  - Output an .sde file
  - Connect to databases and geodatabases



- **NOTE:**
  - Create ArcSDE Connection File: deprecated at 10.3
    - `arcpy.CreateArcSDEConnectionFile_management`

DEMO:

Creating Connections



Geodatabase Creation with Python

Two Tools for Geodatabases:

- **Enabling A Geodatabase:**
  - `arcpy.EnableEnterpriseGeodatabase_management`
- **Creating A Geodatabase**
  - `arcpy.CreateEnterpriseGeodatabase_management`

Enabling A Geodatabase:

- `arcpy.EnableEnterpriseGeodatabase_management`
  - You already have an existing database
  - Lays down Geodatabase Repository
    - GDB Tables and Stored Procedures
  - Must connect as appropriate user

Creating Enterprise Geodatabases:

`arcpy.CreateEnterpriseGeodatabase_management`

- Create Enterprise Geodatabase tool

- When you have a need for:
  - Creating testing or development environments
  - Database does not already exist

- Run as DBA

Creating Users:

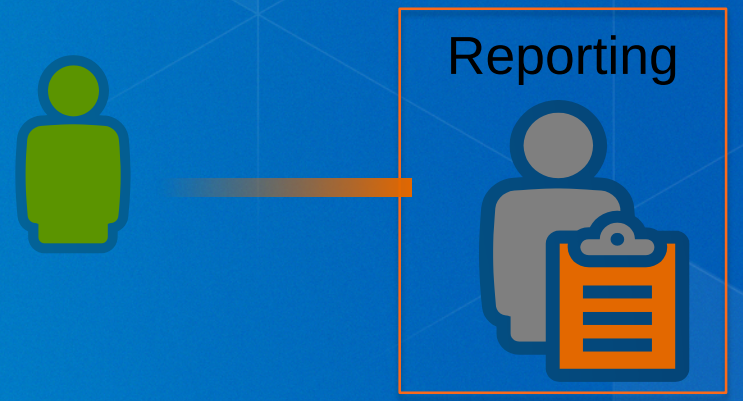
```
arcpy.CreateDatabaseUser_management
```

- Creates a user in enterprise geodatabase or database
- Cannot create geodatabase administrative user
- Run as DBA not GDB Administrator

Creating Roles:

```
arcpy.CreateRole_management
```

- Makes it easier to assign/revoke privileges to multiple users
- Prior to creating users in the geodatabase
- Assign users to roles
- DBA not the GDB administrator

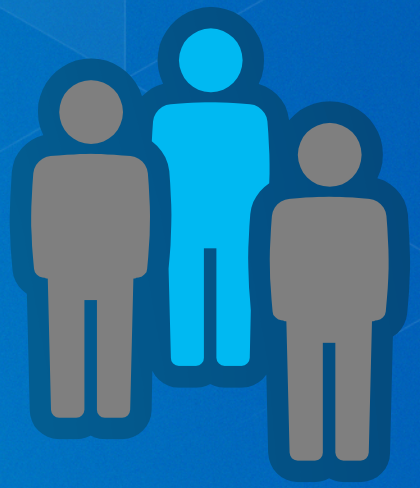


Demo

How to Create a Geodatabase

Creating and Loading Data

- Numerous tools for creating any type of data:
  - Create table, Create feature class, Create Raster Dataset, etc.
  - Create Geometric Network, Create Topology, Create Domain, etc.
- •Also tools for loading data:
  - Feature class to feature class (single)
  - Feature class to geodatabase (multiple)
  - Import XML workspace
- •Write a custom script



Configuration Keywords

- New tool at 10.3 for managing keywords
- Export and import
  - Export Geodatabase Configuration Keyword tool
  - Import Geodatabase Configuration Keyword tool
- Workflow
  - Export
  - Edit with text editor
  - Import

Managing privileges

- Allow other users of the geodatabase to view or edit data that you own
- Change privileges tool
- Allows multiple input datasets to be passed in
- Grant view only or view and edit
  - View = select
  - Edit = insert, update, delete
- Must be connected as data owner

Demo:

Putting it all together

Version administration

Parts of the version administration workflow

- Reconciling/posting/compressing
- Updating statistics and indexes on system tables
- Updating statistics and indexes on user data tables
- Managing user connections

Managing user connections

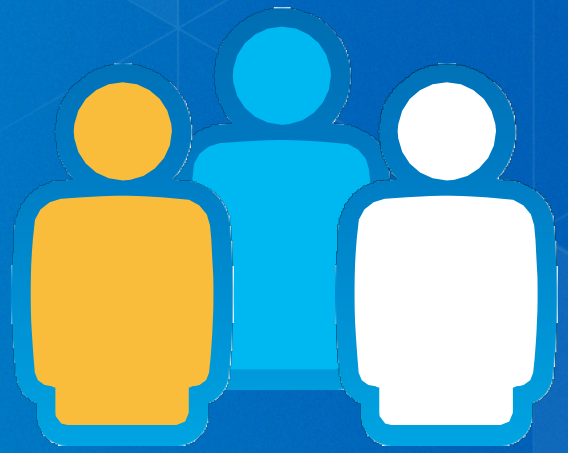
- Block/allow connections
  - `arcpy.AcceptConnections`
  - Provide boolean
- Finding connected users
  - `arcpy.ListUsers`
  - Returns a tuple of properties for each connected user
  - ID, name, machine name, connection time, connection type
- Disconnecting users
  - `arcpy.DisconnectUser`
  - Use ids provided from listusers function or use ‘ALL’ keyword

Disconnecting user connections

- A user who is connected but has gone home
- Create a cold backup of the database
- Running large queries that are using up resources
- Reconcile/post/compress process (optional)

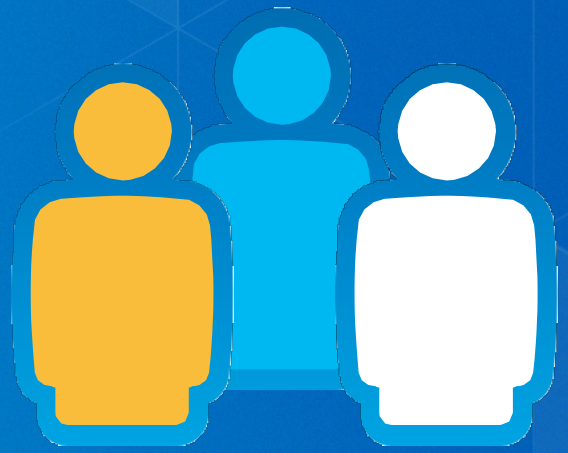
Reconciling and Posting Versions

- Reconcile = pulling changes from a parent to child version
- Post = pushing reconciled changes to parent version from child
- Reconcile versions tool
- Recommended to run as geodatabase administrator
  - Can ‘see’ and reconcile all versions in the geodatabase



Indexes and Statistics

- Update after major ‘data change’ events
  - Reconcile
  - Compress
  - Appending data
  - Typically not necessary after loading new data
- Can be done by both:
  - Geodatabase Admin (system tables)
  - Data owner (data tables)
- We suggest to run regularly.



Demo:

Version Maintenance

Summary

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Understanding our world.