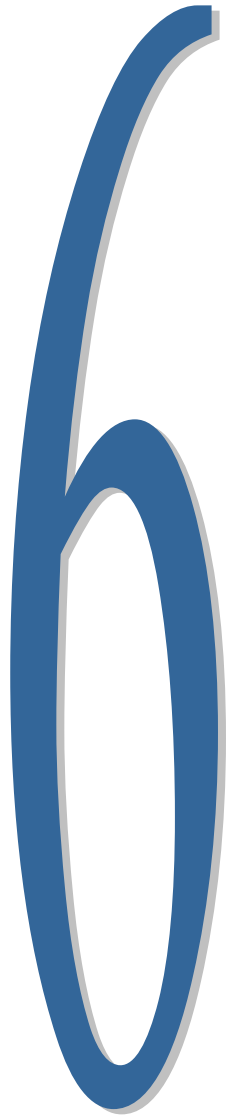


ArcSDE architecture and connections



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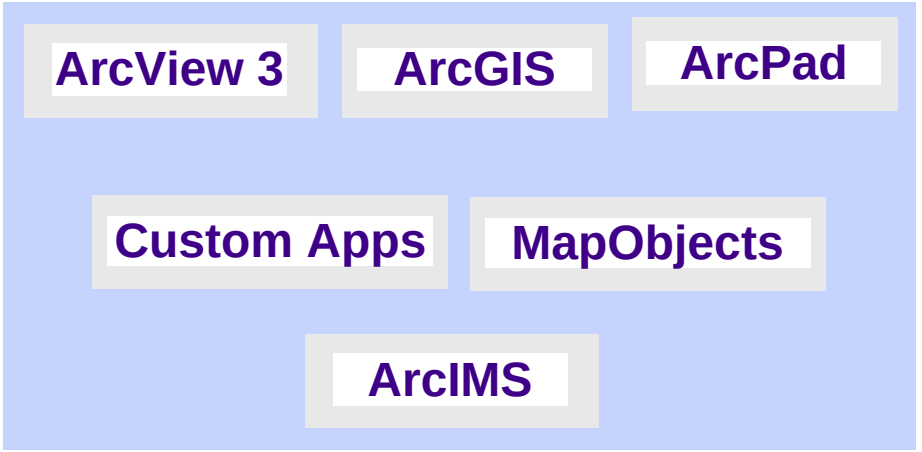
Lesson overview

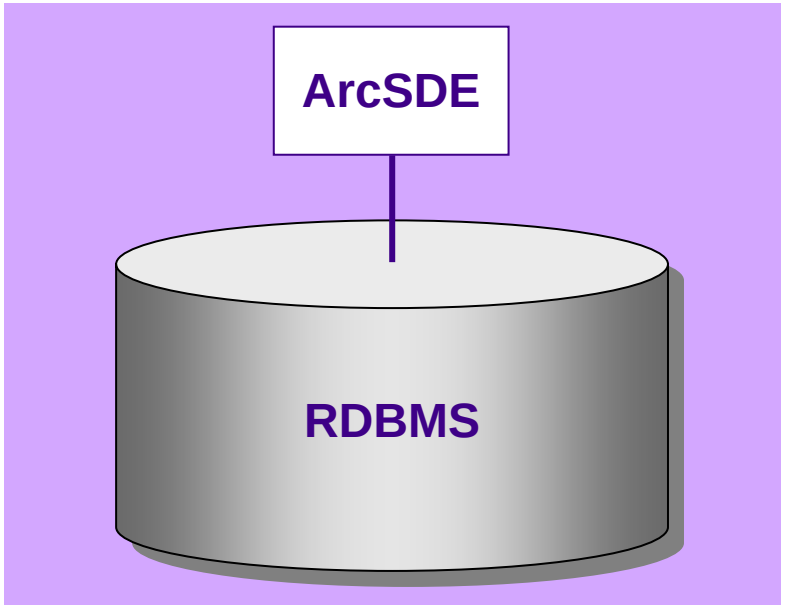
- ArcSDE system components
  - Application Server Connections
  - Direct Connect
- Geodatabase properties
- ArcSDE versions
  - What is a version
  - ArcIMS and versions

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ArcSDE

- Centralized spatial database
  - Large, non-tiled layers
  - Rapid spatial searching
  - Storage options for raster and vector data
- Integrates spatial and tabular data
- Concurrent access for large number of users
  - Versioning/multiuser editing
- Fully integrated with ESRI client software

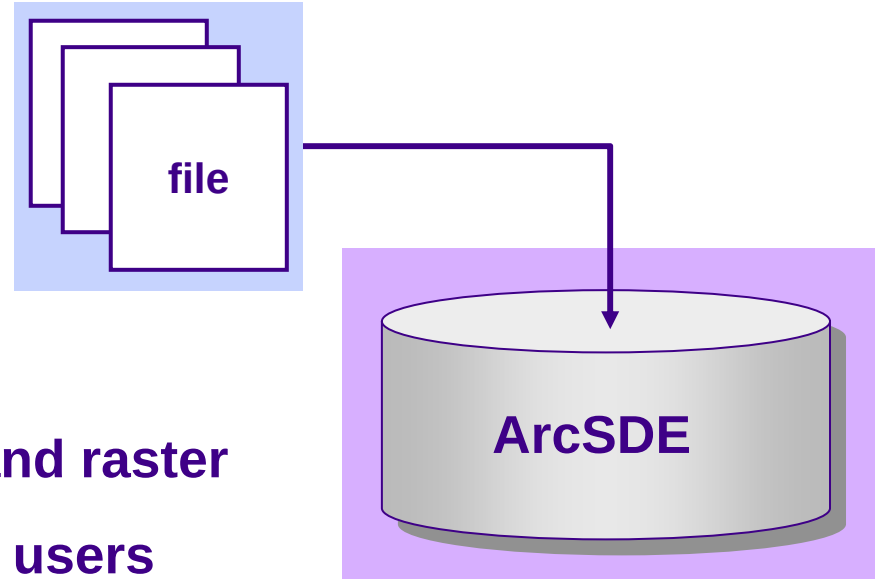




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Why store data in ArcSDE?

- **Benefits**
  - RDBMS security
  - RDBMS backup and recovery
  - Store both vector or raster data
  - Common data format for vector and raster
  - Simultaneous access by multiple users
  - RDBMS data management and retrieval
  - Can have large layers of continuous spatial data
  - Support large continuous images
- **Load using ArcGIS or ArcSDE commands**
  - Customized loaders can be created with the C API



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ArcSDE network traffic

- ArcSDE vs. File Sharing
  - Compare amount of data transferred over network for a request

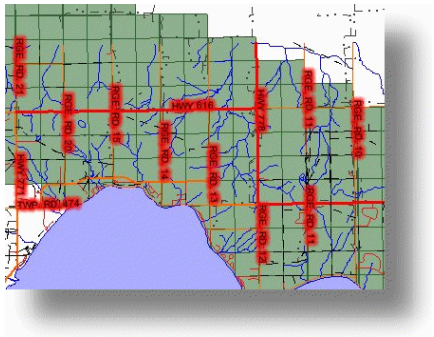


Image 1 (vector only)

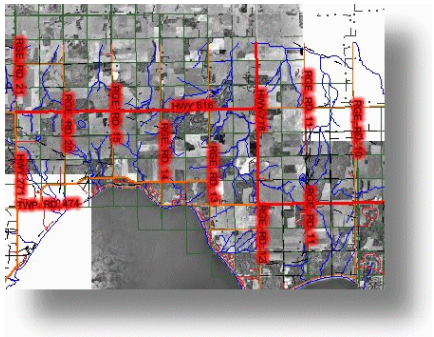


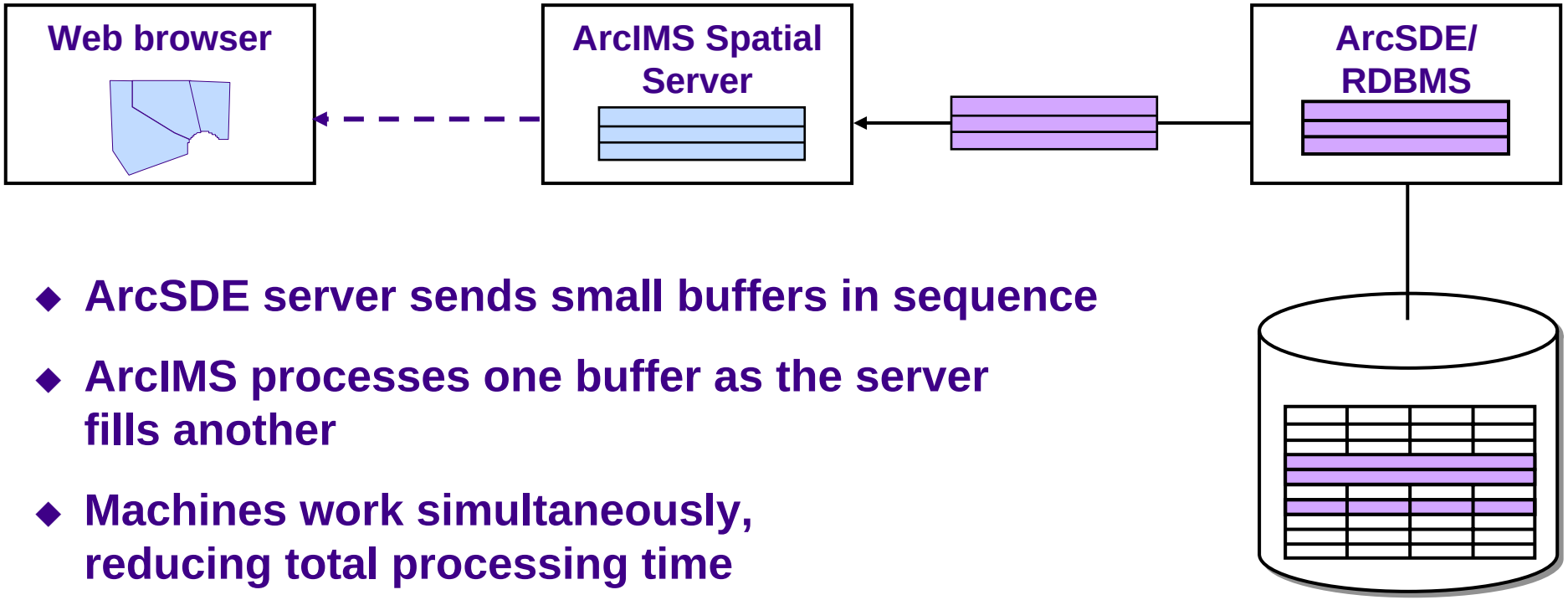
Image 2 (vector and image)

	Image 1	Image 2
ArcSDE Application Server	137 KB	353 KB
ArcSDE Direct Connect	253 KB	499 KB
UNC file sharing	1124 KB	116095 KB

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Retrieving data from the server with SQL

- ArcIMS is a client to ArcSDE
- ArcIMS requests record from the RDBMS with SELECT statements
- Most queries processed as asynchronous streams

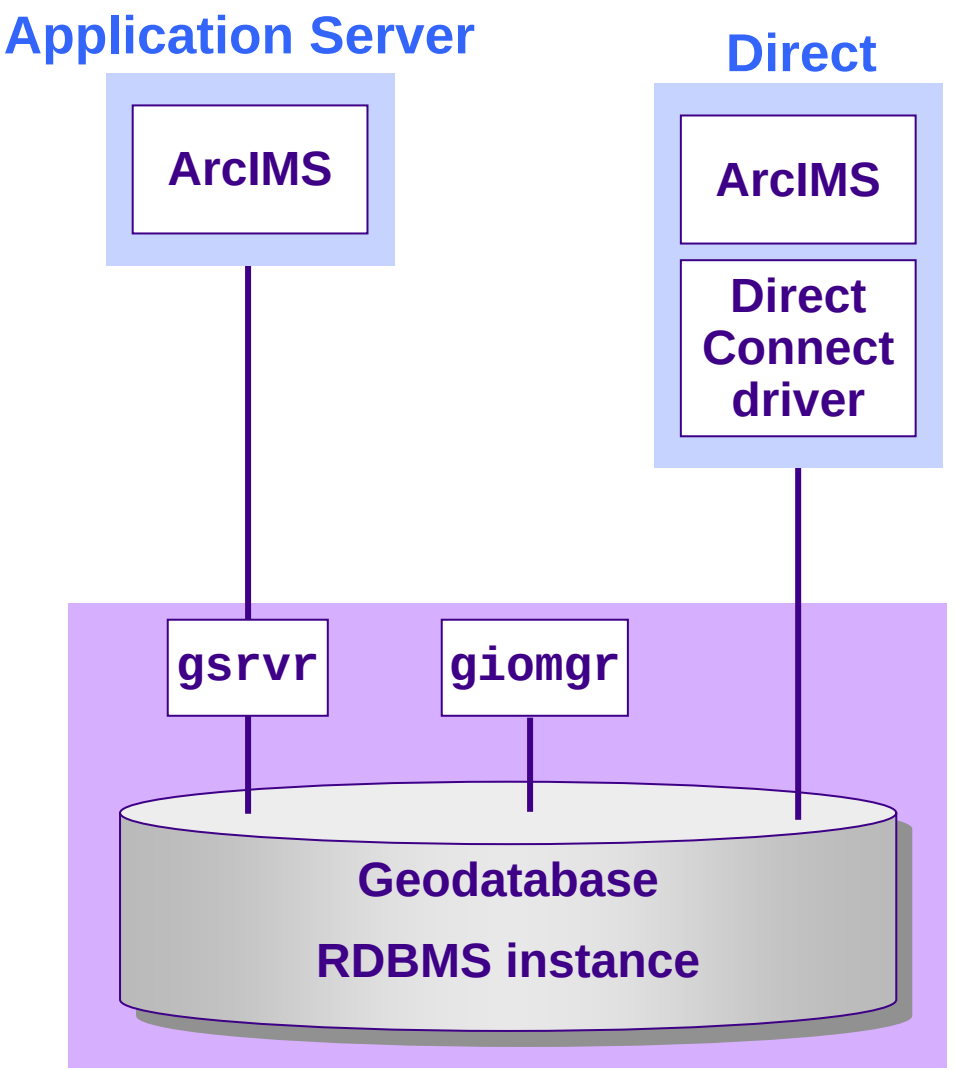


- ArcSDE server sends small buffers in sequence
- ArcIMS processes one buffer as the server fills another
- Machines work simultaneously, reducing total processing time

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ArcSDE system components

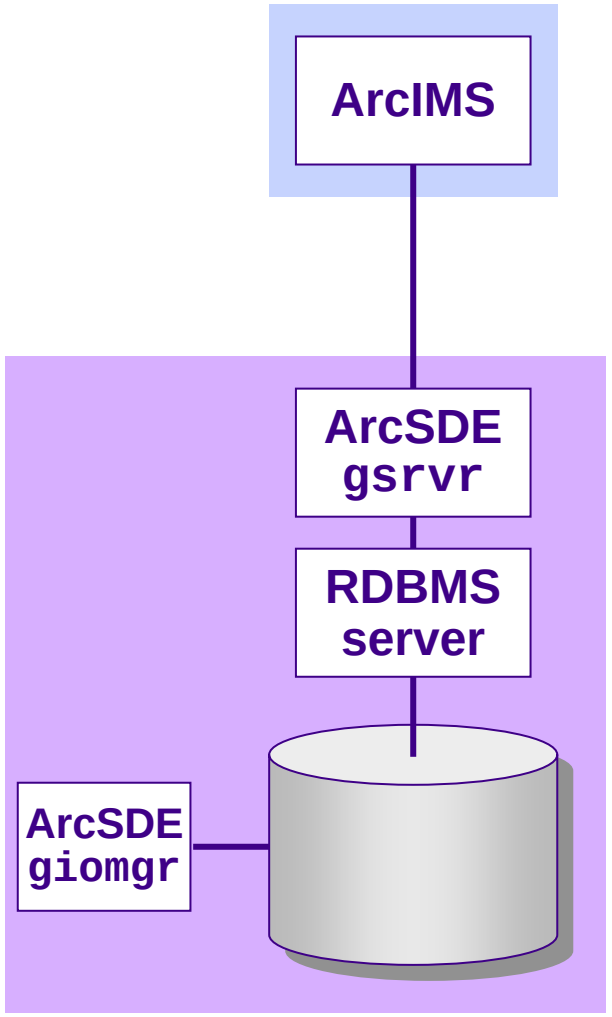
- `giomgr` listens for client connection requests
- `gsrvr` is spawned for every Application Server connection
- Direct connection connects directly to the RDBMS
- All communication through TCP/IP network
  - `giomgr` and `gsrvr` communicate through a dedicated port



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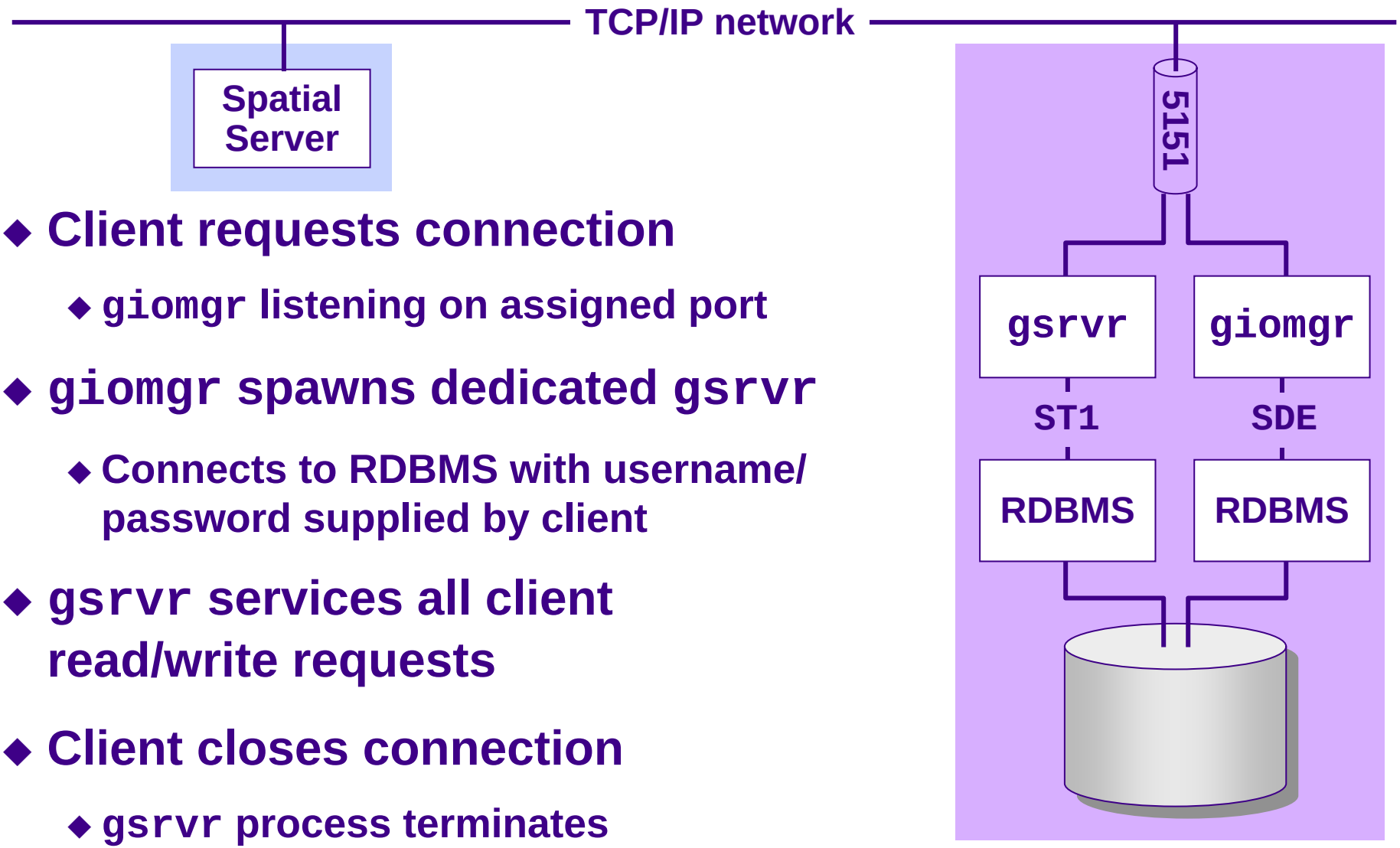
ArcSDE Application Server connection

- Traditional ArcSDE connection method
  - Available for all supported RDBMS
- GIS client requires no additional software
- Server requires ArcSDE instance
  - `giomgr` spawns one dedicated `gsrvr` process per connection
- Performance considerations
  - Decreases client load
  - Decreases network load
  - Increases server load



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Application Server connection life cycle

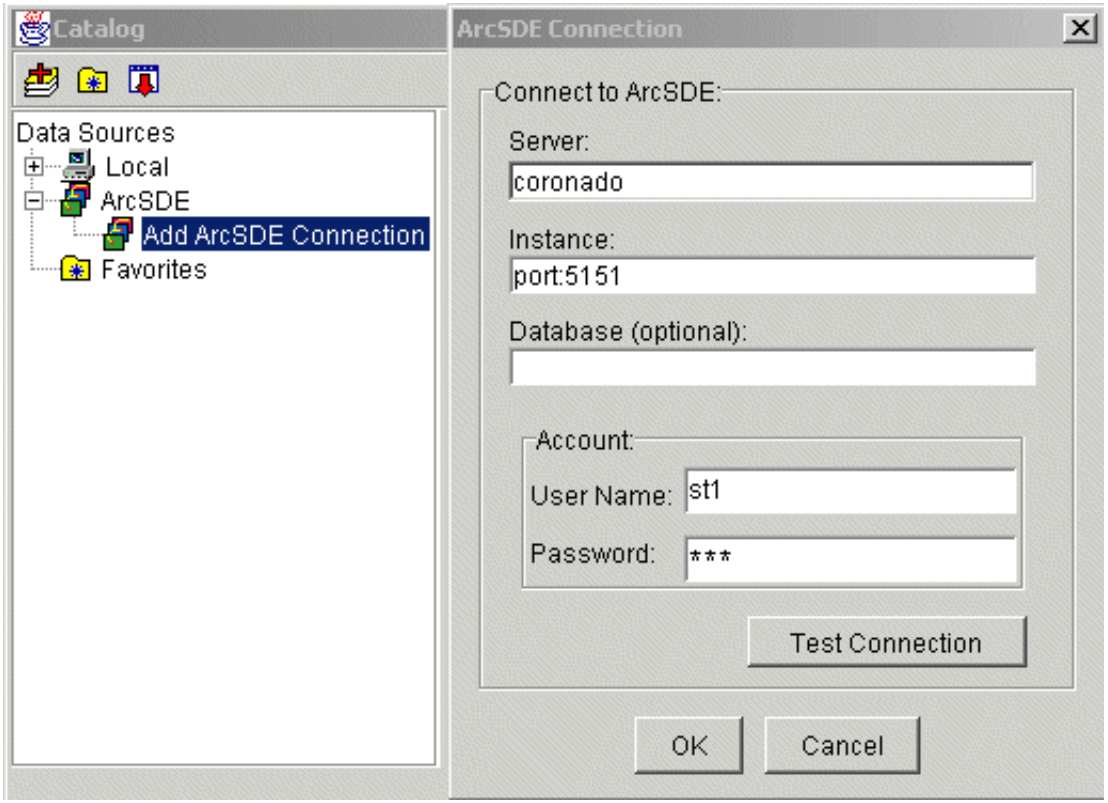


- Client requests connection
  - `giomgr` listening on assigned port
- `giomgr` spawns dedicated `gsrvr`
  - Connects to RDBMS with username/ password supplied by client
- `gsrvr` services all client read/write requests
- Client closes connection
  - `gsrvr` process terminates

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Connecting to ArcSDE

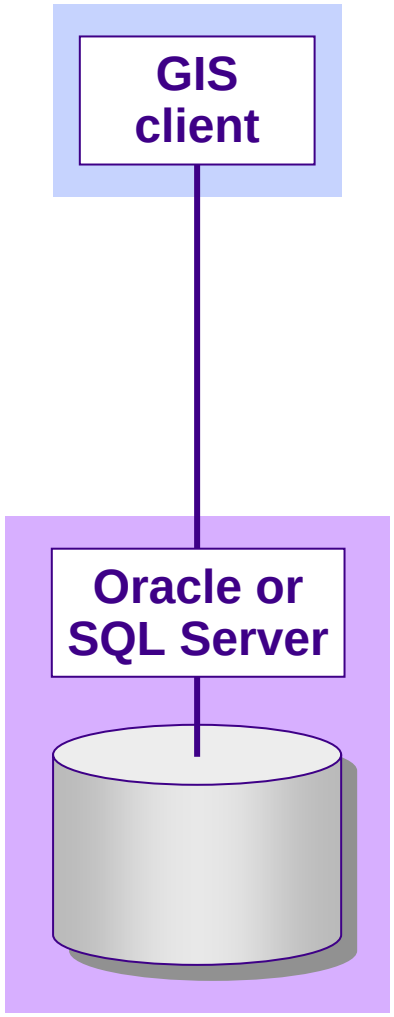
- Information needed to connect through Author
  - Server
  - Instance (service)
    - ArcSDE port number
  - Database
    - Optional
    - Used with
      - IBM DB2
      - Informix
      - SQL Server
  - Username
  - Password



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ArcSDE Direct Connect

- Available for Oracle 8i/9i and SQL Server
  - ArcIMS Spatial Server has `gsrvr` functionality included
  - Oracle Net software on ArcIMS Spatial Server machine (Oracle only)
- No `gsrvr` or `giomgr` processes required on server
- Performance considerations
  - Increases client load
  - Increases network load
  - Decreases server load



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Creating a Direct Connect to Oracle

- Cannot be created through ArcIMS Author
- Requires Oracle networking software installed on the Spatial Server machine
- `instance` must be `sde:oracle` or `sde:oracle9i`
- Password must be followed by the `netservice_name`
  - Password can not be encrypted

```
<WORKSPACES>
    <SDEWORKSPACE name="sde_ws-0" server="coronado"
    instance="sde:oracle" database="" user="st1"
    encrypted="false" password="st1@aadm.class"
    geoindexdir="" />
</WORKSPACES>
```

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Creating a Direct Connect to SQL Server

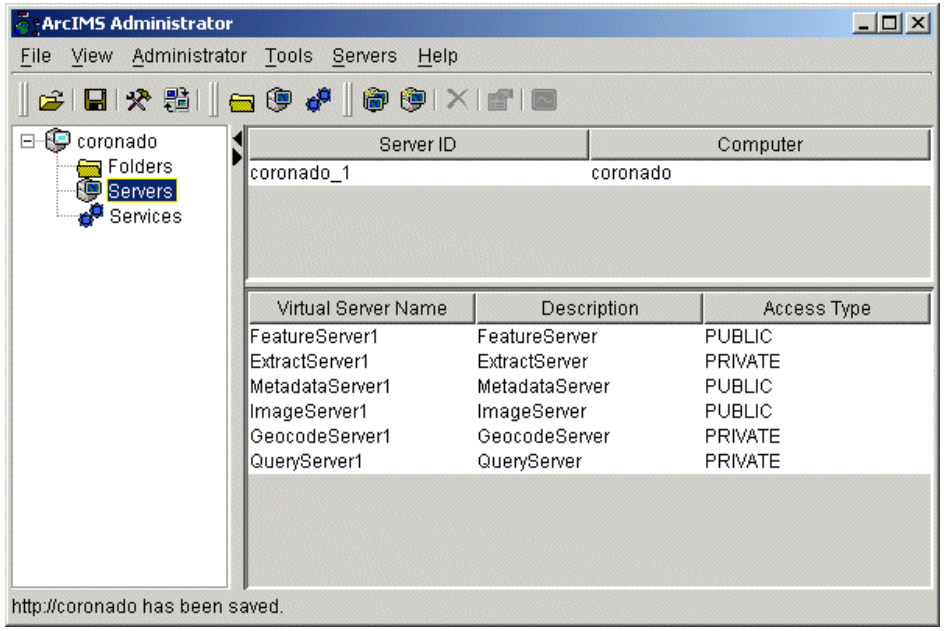
- Cannot be created through ArcIMS Author
- Must create a `datasource_name` on the RDBMS server
  - This is typically the name of the RDBMS server
- `instance` must be `sde:sqlserver:<datasource_name>`
- Password cannot be encrypted

```
<WORKSPACES>
    <SDEWORKSPACE name="sde_ws-0" server="hector"
    instance="sde:sqlserver:hector" database="aadm"
    user="st1" encrypted="false" password="st1"
    geoindexdir="" />
</WORKSPACES>
```

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Virtual Servers

- Virtual Server
  - Each instance results in a connection to ArcSDE or to the RDBMS
- Image Service
  - Uses Image Server and Query Server instances
  - A connection is made for every Image and Query instance
- Additional functionality using Geocode or Extract Server
  - Adds connections to ArcSDE or the RDBMS



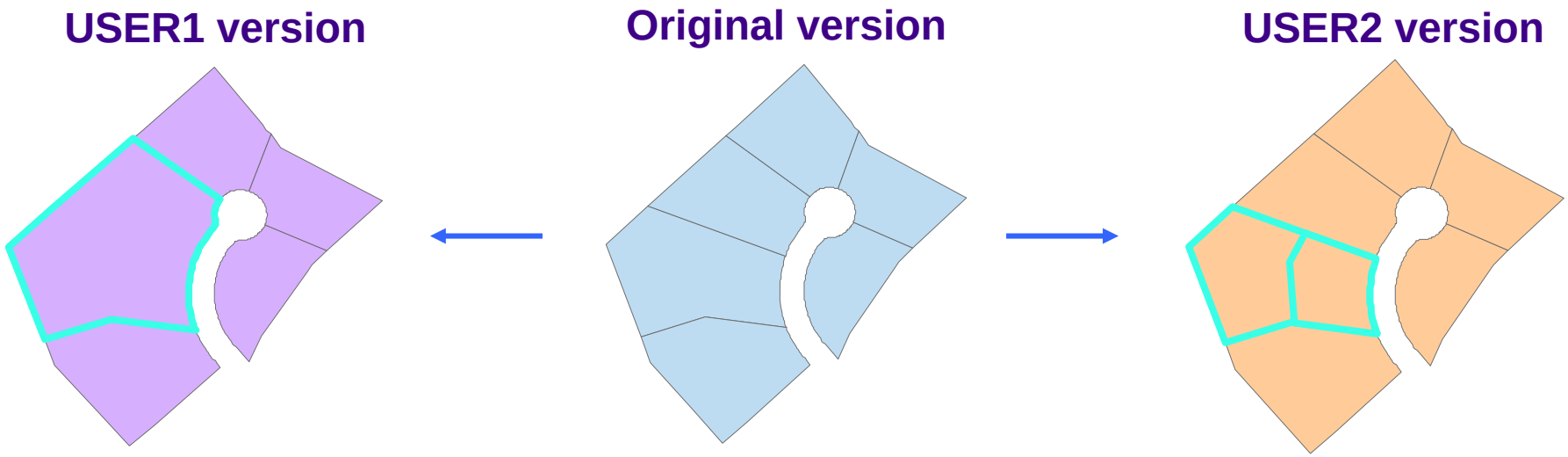
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Geodatabase

- Database of geographic objects
  - Objects have properties and behavior
- Properties stored in the database
  - Feature geometry and attributes
  - Rules, relationships, classifications, metadata
- Behavior implemented by ArcObjects clients
  - ArcMap, ArcCatalog
  - ArcMap Image Server can be used to serve geodatabase properties

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What multiversioning is



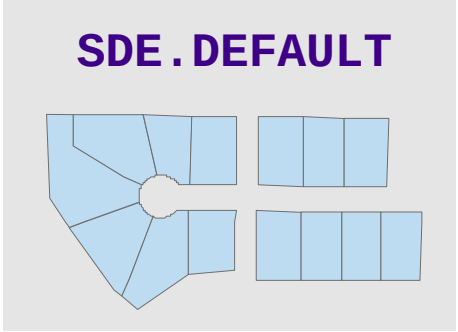
- Method for tracking and presenting changes to tables
  - Groups of changes accessed as self-consistent versions
- Multiple, alternate versions may coexist
  - Appears to users as if they have their own copy of a table
- Includes mechanisms for reconciling versions
  - Integrates changes into one version
  - Clients offer tools to resolve conflicts

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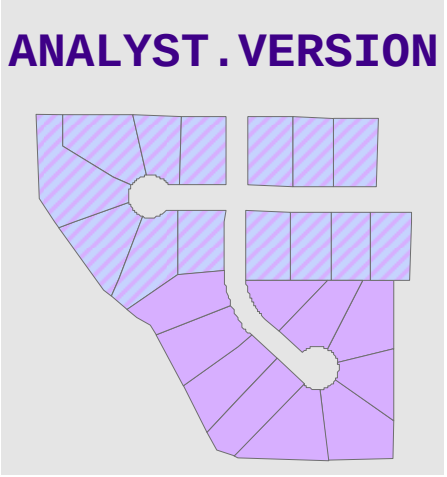
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ArcIMS and versions

- ArcIMS Image and Feature Servers
  - Serves the `SDE.DEFAULT` version
  - Any changes to alternate versions will not be served



ArcIMS serves default version



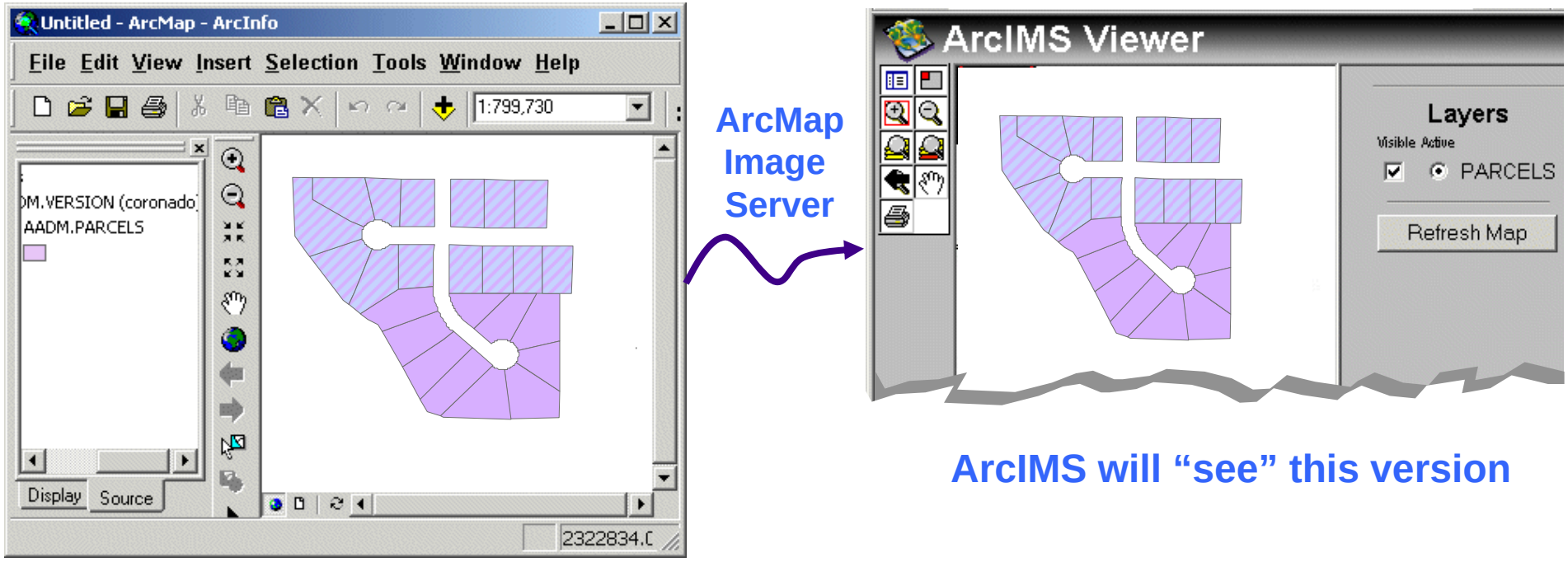
Analyst's project (creates alternate version)

ArcIMS will not "see" this version

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Using versions with ArcIMS

- Accessing alternate versions
  - Create an ArcMap map document referencing an alternate version
  - Use the ArcIMS ArcMap Image Server to serve the `.mxd` file



ArcIMS will “see” this version

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Administration tools

- Command line utilities for managing the ArcSDE server and loading data
  - Executed at operating system prompt
  - May be used remotely
- Syntax:
  - Required parameter `sdemon -o info`
  - Optional parameter `[ ]`
  - Substitute a value `< >`
  - Choose value from list `-I <{users | config | stats | locks }>`

```
sdemon -o info -I <{users | config | stats | locks }>
       [-i <instance>]
```

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Exercise 6 overview

- Explore the ArcSDE software architecture
- Create an Application Server connection
- Create a Direct Connect
  - For Oracle and SQL Server only
- Explore ArcSDE versions

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