Leveraging PostgreSQL with ESRI's ArcGIS system

Derek Law
Product Management Group
FOSS4G Lab 14 – September 26, 2007

Copyright © 2007 ESRI
All rights reserved.

The information contained in this document is the exclusive property of ESRI and is subject to change without notice.

Other companies and products mentioned herein are trademarks or registered trademarks of their respective trademark owners.
Agenda

- ESRI – Background
- Open Source & ESRI
- Overview of Enterprise GIS
- Introduction of ArcGIS Server Enterprise
  - ArcSDE Technology
  - Enterprise geodatabase
  - Implementation on PostgreSQL
- Summary
- Exercise
ESRI – company background

• Founded in 1969; located in Redlands, CA
• A research & development company focused on GIS technology & its community
  – Software development
  – Consulting & application solutions
  – Educate & promote GIS science/technology
• U.S. & International offices
Open source & ESRI

- ESRI uses a variety of open source technology in software development
- Encourage developers to employ open source technology & interoperability for their application solutions
Open source & ESRI

- Continue work with the open source community to further GIS research & development
- Active participant in open source & interoperability standards communities
GIS is evolving towards Enterprise Information Systems

Desktop Tools & Data
- Personal Productivity
- Professional

Client / Server Systems
- Workgroup Information Management

Web Services Networks
- Enterprise GIS Services

Networks
What is an Enterprise GIS system?

- Provides broad access to geospatial data & services
  - Common infrastructure to build & deploy GIS
- Generally multi-department & integrated with other enterprise systems
  - e.g., Land records management
- Helps to achieve business objectives
- Scaleable, reliable, & secure
- Supports interoperability & IT standards

**Bottom line:** An enterprise GIS should meet an organization's needs both collectively & individually
Enterprise GIS system challenges

- Sharing services & information across departments
- Good design/implementation vs. quick results
- Consensus on a common set of standards & governance processes
- Not losing sight of the business strategy behind the project
- Budget constraints ($$$$
- After establishing: Maintaining performance
Small enterprise GIS configuration

Clients

Web Server & GIS Application Server

Data Server

Network

DBMS
Large enterprise GIS configuration
Service Oriented Architecture

Clients | GIS Web Server | GIS Application Server | Data Server

Network | DBMS
Performance model

- Response time for end user
- Total response time:
  - Based on load, # of users, & # of operations
ArcGIS: a complete GIS

Client

Server

Storage

ArcGIS Desktop
ArcGIS Explorer
Web Mapping Application
ArcGIS Mobile
Open APIs

ArcGIS Server
ArcGIS Server Enterprise

- Consists of 4 components:
  - Server Object Manager, Server Object Container, ArcSDE Technology, & Web App Dev Framework

- ArcSDE Technology
  - The gateway between GIS clients & DBMS
  - Enables users to easily store, access, & manage spatial data on the leading DBMS platforms
  - Essential component to set-up & maintain an enterprise geodatabase
  - Supports:
    - Multi-user editing environment
    - Complex GIS workflows
    - Geospatial data integration with IT systems
Introducing the Enterprise Geodatabase

• A container for spatial & attribute data
  – GIS data stored in a DBMS using ArcSDE Technology
  – Leverages existing DBMS functionality with ArcObjects functionality
  – Capable of modeling complex spatial relationships
  – Supports data integrity with business rules
  – Scaleable

• ArcGIS has suite of tools to migrate existing GIS data
Geodatabase elements

Feature dataset
- Feature class
  - Polygon
  - Line
  - Point
  - Annotation
  - Dimension
  - Route
- Relationship class
- Topology
- Geometric network
- Network dataset
- Terrain

Raster dataset
- Raster catalog
- Schematic dataset
- Cadastral Fabric
- Survey dataset

Toolbox
- Tool
- Model
- Script

Behavior
- Attribute domains
- Relationship rules
- Attribute defaults
- Connectivity rules
- Split/merge policy
- Topology rules
ArcSDE Technology for PostgreSQL

- Next ArcGIS release in 2008
- Standard Enterprise ArcSDE install
  - Will include PostgreSQL database
- Supported platforms:
  - Windows, Linux (Red Hat & SuSe), & Sun Solaris
- Geometry storage managed through spatial types
  1. ESRI spatial type \((\text{ST\_Geometry})\)
     - Conformance with the ISO/OGC simple feature specifications
  2. PostGIS – Open source spatial type \((\text{Geometry})\)
- Complete geodatabase data model enabled

*Note: ALL CONTENT NOT FINALIZED*
Geometry storage in PostgreSQL

- Geometry stored as a custom DBMS data type
- SQL spatial functions are defined for all operations on the geometry object
- OGC compliant operators supported
Geometry storage in PostgreSQL

- Contents of spatial type attribute field
Advantages of spatial types

- Ability to integrate spatial types throughout the enterprise GIS
  - Share data between ArcGIS & other applications
  - SQL access to spatial data implies that you do not need ArcGIS to view geometry
  - Perform spatial operations at the SQL level using spatial operators

Non-ArcGIS client
Available SQL functions

- Spatial functions defined on the spatial type
  - Constructor functions
    - Build a geometry object
  - Accessor functions
    - Access properties of a geometry object
  - Transformation functions
    - Construct new geometry objects from existing geometry objects
  - Relationship functions
    - Test the spatial relationship between 2 geometry objects
Installation of ArcSDE for PostgreSQL

- **Install PostgreSQL software**
  - Included with ArcGIS Server Enterprise

- **Install ArcSDE Technology software**
  - Create SDEHOME directory
  - Post-install wizard (4 steps)
    1. Create database & 'sde' user
    2. Create repository tables
    3. Authorize software
    4. Create ArcSDE service (Windows only)
Summary

• ESRI – brief company profile
  – Its relationship with open source community
• Enterprise GIS
• ArcGIS Server Enterprise
  – ArcSDE Technology
  – Enterprise geodatabase
  – Implementation on PostgreSQL

• Looking for ArcSDE on PostgreSQL beta program participants