Enterprise GIS – Solutions to GIS Data Dissemination

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Wendy M. Turner
Senior GIS Engineer & Program Manager
Freedom Consulting Group, LLC

Building the Enterprise

- Storage and Distribution of Foundation Map Data
- Deploying and Supporting GIS Web Mapping Applications
- GIS Support and Customer Satisfaction

Enterprise GIS – The Objective

- To disseminate GIS datasets (raster and vector) to a large GIS customer base
- To develop and maintain methodology and procedures for keeping the GIS datasets current
- To create multiple solutions for enabling GIS customers utilizing various GIS tools methods for retrieving data
- To provide a superior level of support to customers concerning GIS datasets and GIS applications and tools

Enterprise GIS – The Components

- Foundation Map Repository
  - 3 – 30 TB Oracle 10g/ArcSDE Databases
    - DTED and SRTM Raster Catalogs
    - NGA CADRG/CIB Catalog
    - Commercial Imagery – NaturalVue & CitySphere
    - Vector Map (VMAP) Levels 0 & 1
    - Place Names Datasets – Geonames & SPNTL
  - 3 – 13 TB flat file systems
    - ESRI Base Map Vector Data
    - Vector Boundary Data
    - DAFIF Data
    - GeoPDFs

Enterprise GIS – The Components

- GIS Application Servers
  - Multiple Windows 2003 Servers running ArcGIS Server, ArcGIS Tracking Server & ArcGIS Image Server used to serve data & services to the enterprise
  - Development, Staging & Production Servers supported by GIS staff to ensure code is successfully deployed between environments
  - Multiple servers to test operating system and software upgrades

Enterprise GIS – The Components

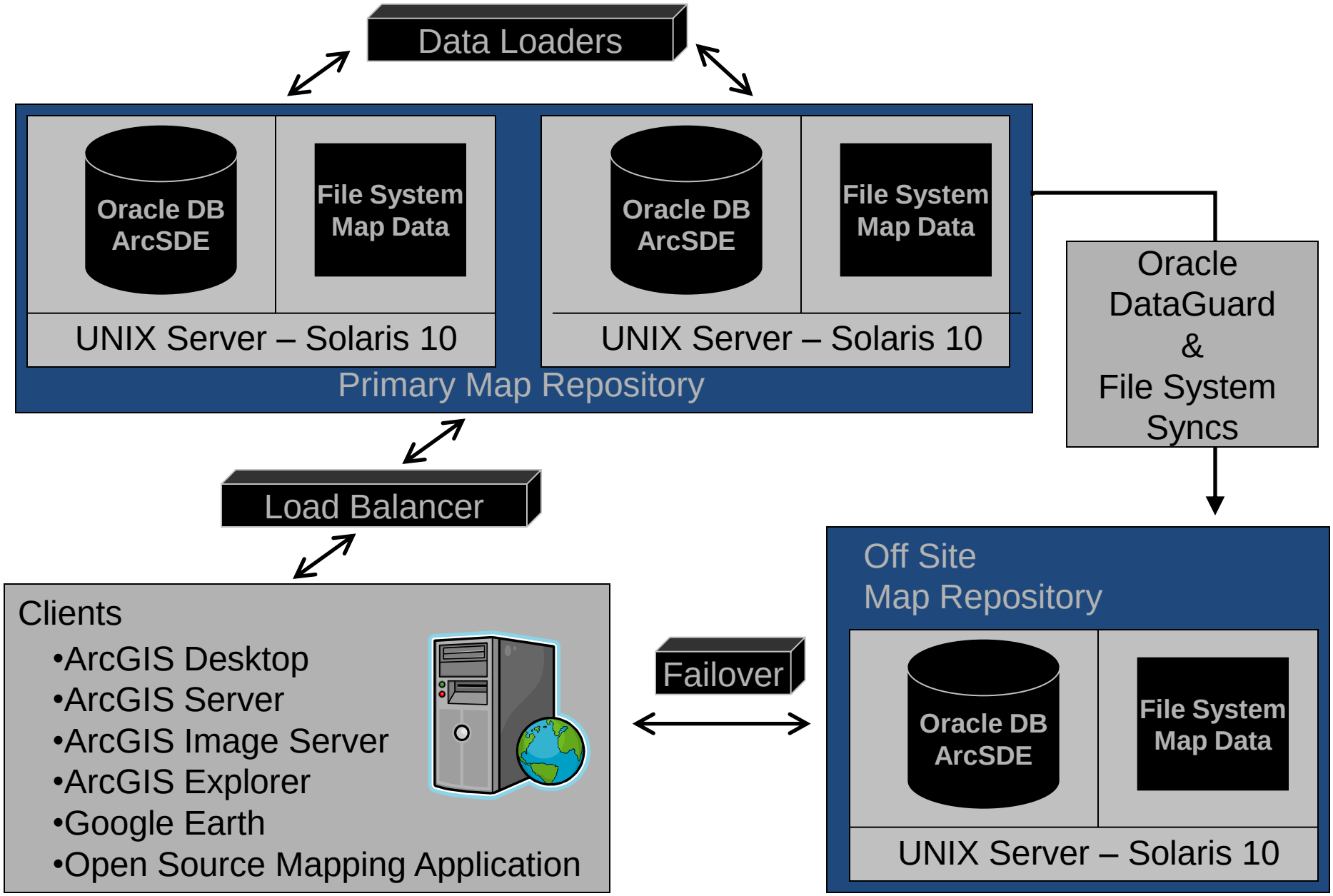
- Customer support to over 5,000 users of the map geodatabase, file system and web mapping applications
- Multiple methods for customers to interact with GIS staff and obtain support:

Phone	**Email**
Internal WIKIs	**Web Site**
Chat Rooms/Instant Messenger	

Foundation Data Geodatabase – The History

- Initial design in 2003
  - Create a large (20+ TB) Oracle 9i/ArcSDE 8.3 geodatabase to store a Military Analyst RPF Catalog, SRTM Catalog and DTED Catalog
  - Store a 13TB file system for GIS users to directly connect to GIS data for use within applications
  - At the time of geodatabase creation, ESRI's ArcSDE/Military Analyst was the best solution for storing and distributing raster imagery
  - Initial creation of the geodatabase took approximately 4 months to load and index the raster data

Foundation Data Geodatabase - Architecture



Foundation Data Geodatabase – Highlights

- Data is easily retrievable by GIS users
  - Uses Spatial Database Connections in ArcGIS
- Automated processes for keeping data updated
  - Uses PERL scripts for downloading and processing of data
  - Uses Python scripts for automated loading into geodatabase
  - Weekly updates are between 50,000 and 200,000 images.
- Performance of the geodatabase is very acceptable for local users
- Reporting tools have been developed to display detailed information regarding loads and data integrity

Foundation Data Geodatabase - Lowlights

- Data stored in geodatabase is 4-8 times larger in size than flat file
  - Due to spatial indexes, pyramiding and uncompressed data formats
- Multiple large databases can be hard to manage
  - Full backups take 24 – 30 hours to complete
  - Requires senior Oracle DBA to maintain database
- Poor performance of geodatabase when accessed from users in remote locations

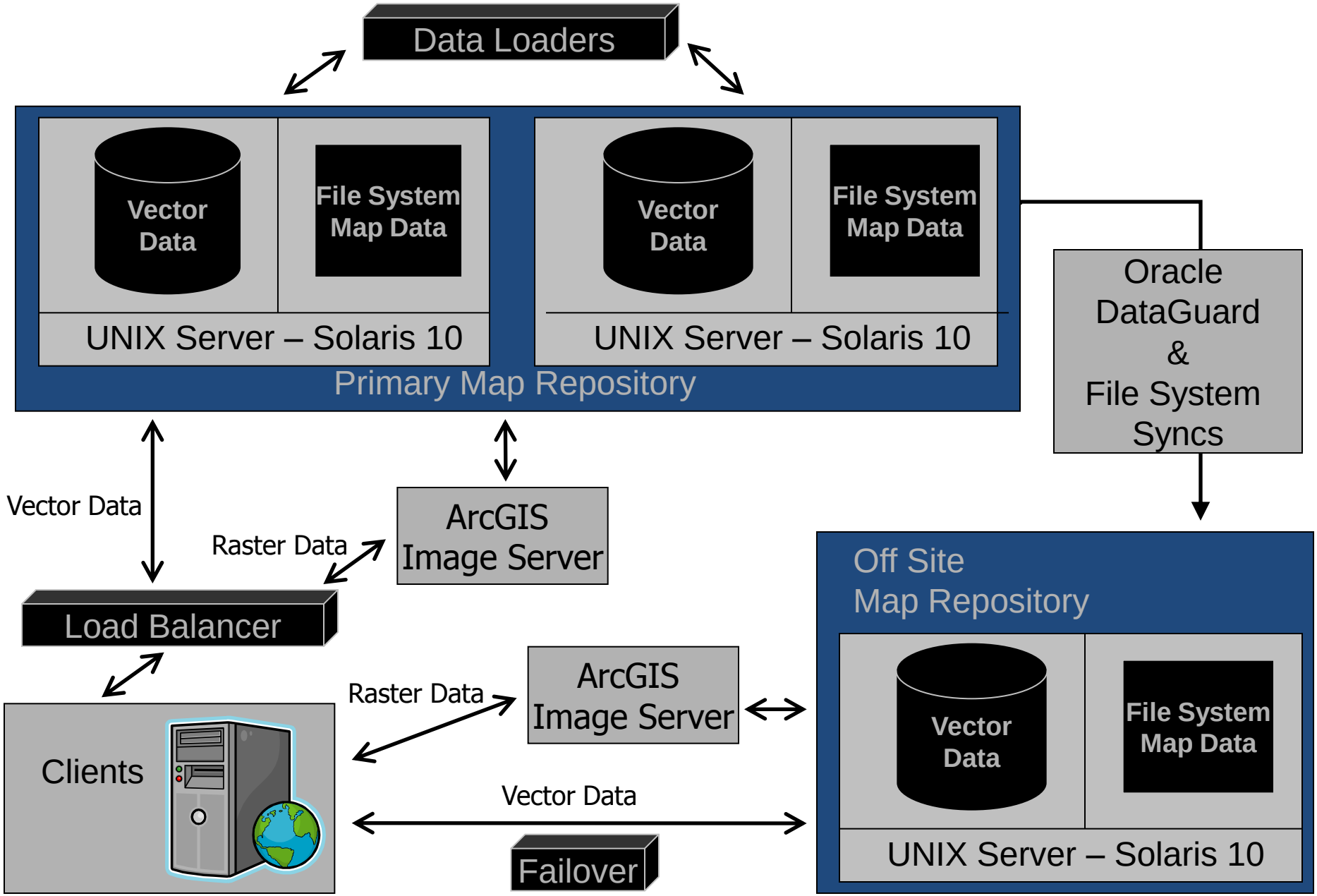
Foundation Data – The Next Step

- Move dissemination of all raster/imagery data from ArcSDE/Oracle to ArcGIS Image Server
  - Image Server utilizes imagery data stored in its native format (MrSID, CADRG, JPEG)
  - No pre-processing of data requires – creates seamless datasets of imagery
  - Improved scalability and performance; requires less bandwidth to distribute data than ArcSDE/Oracle
  - Reduced load/index time of imagery – entire CADRG/CIB data set took less than 72 hours to create
  - Ideal for remote sites with limited network resources

Foundation Data – The Next Step

- Continue to use ArcSDE/Oracle as the repository for vector datasets
  - Organize geodatabase for ease of usage by customers
    - Schema based organization
    - GIS Feature Data Sets within database
  - Ability to use the power of Oracle for spatial queries on large datasets (greater than 5 million records)

Image Server Architecture



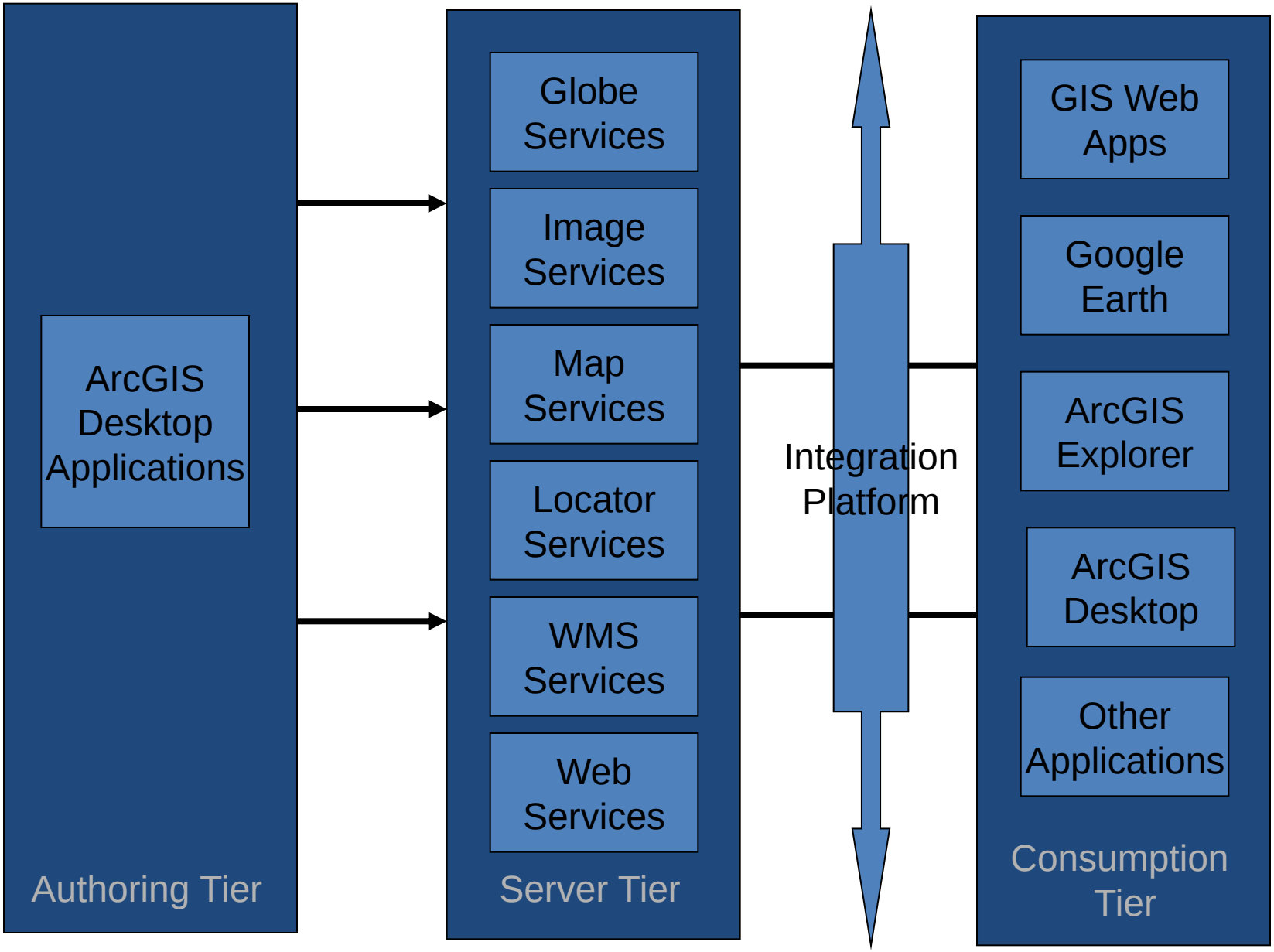
Foundation Data – The Next Step

- Create “Search & Discovery Portal” application for use by analysts, data owners and administrators
  - Looking into using ArcGIS 9.3.1 GeoPortal Extension for ArcGIS for implementing this technology
  - Benefit to the client by taking advantage of an “out of the box” solution for creating a spatial data infrastructure (SDI)
  - Will allow users to easily search for relevant GIS data sources and services deployed throughout the enterprise
  - Ensure that users are using the appropriate data sets for their analysis by creating metadata catalogs

Geospatial Service-Oriented Architecture (SOA)

- To provide methods for system development & integration operating as interoperable services
- To create a federated resource for disseminating GIS data and tools using web services, SOAP and REST
- Used to improve geospatial services offered by providing accessibility and efficiency to many customers

GIS Server Architecture

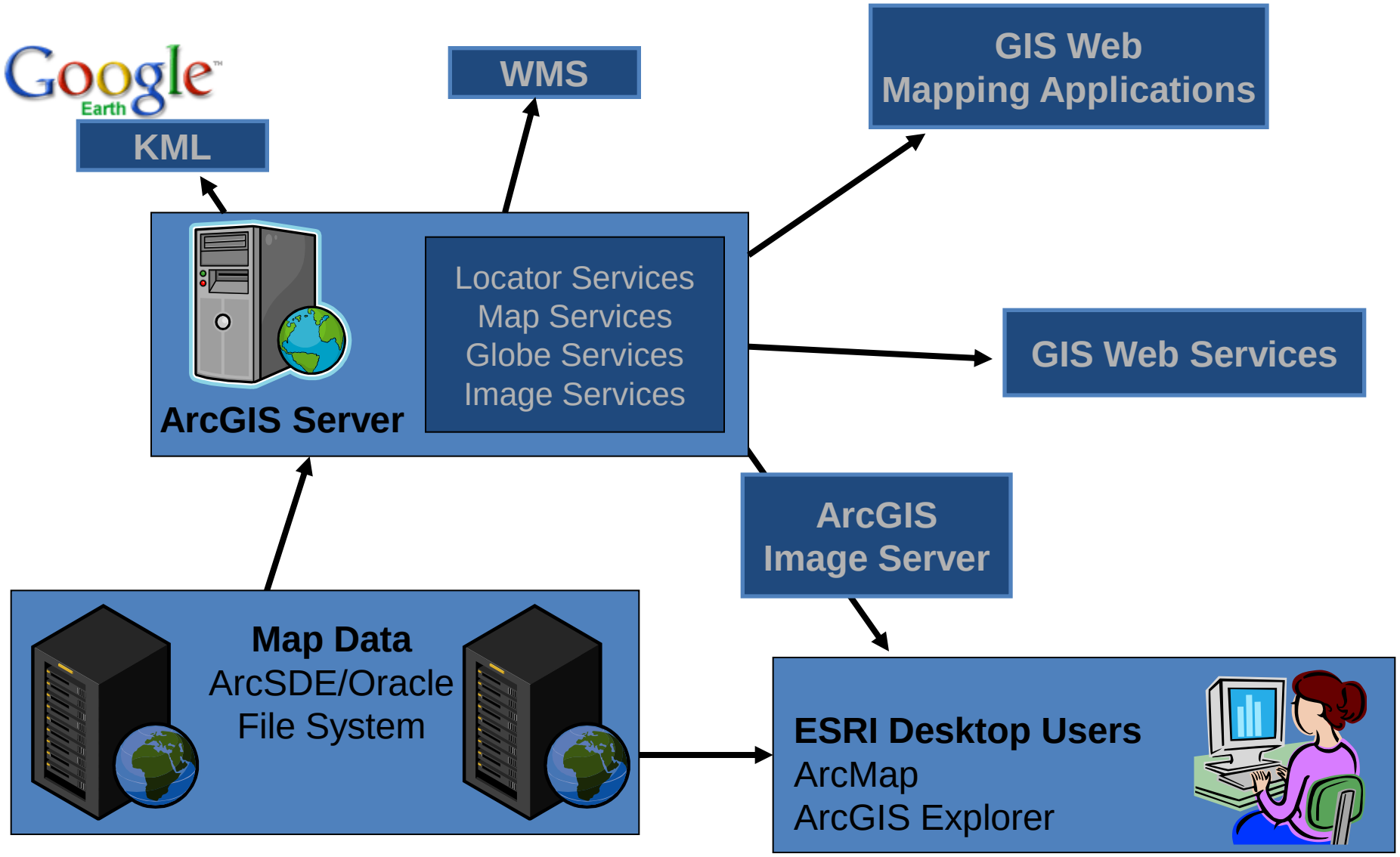


GIS Server – Standards Conformity

- To ensure the ease of integration with various clients, standards are enforced within the GIS Enterprise

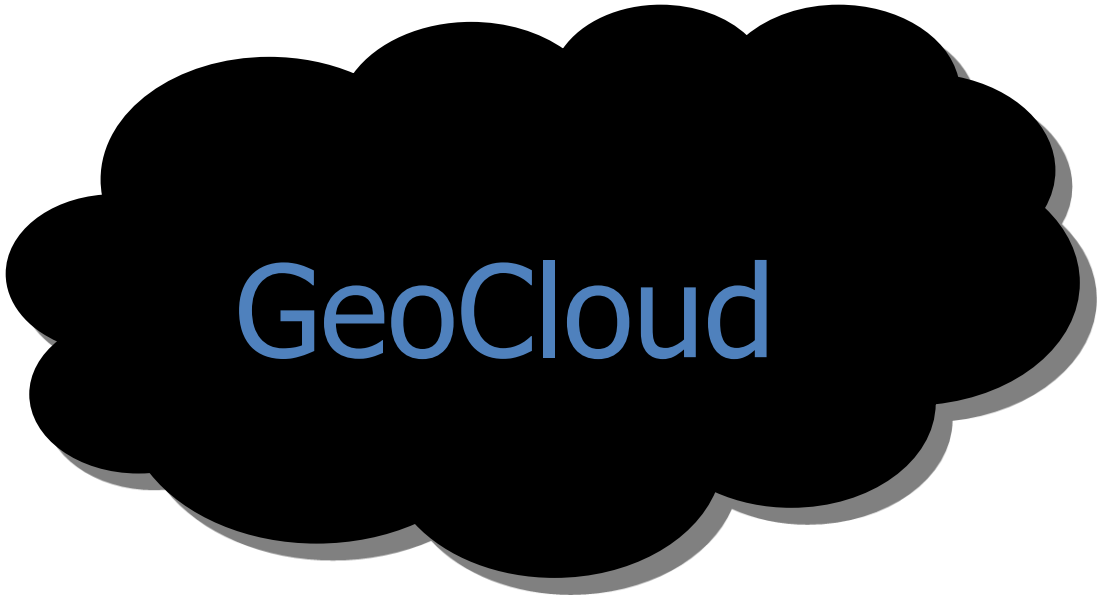
- **Database (SQL)**
- **Web Services (.NET, XML, WSDL, SOAP)**
- **GIS Data Formats (Shapefiles, KML, File Geodatabases)**
- **Programming Languages (.NET, Python, C#)**

ArcGIS Server



ArcGIS Server – The Future

- Cloud computing environment
  - Private cloud
  - Self-service web administration
  - Virtualization



Customer Support & Service

- Important to keep everyone in the enterprise "happy"
- Proactive with dealing with changes
  - Inform users about upcoming upgrades in software/applications
  - Inform users about new datasets stored within the geospatial repository
- Require staff to take training on new technologies in order to better support customers

Customer Support & Service

- Important to keep all systems running optimally to ensure optimal performance, availability and scalability
  - Use Oracle GRID control for monitoring database activity, performance and issues
  - Use Dell OpenManage to monitor web servers
  - Custom applications and scripts have been created to manage GIS web services, web applications, ArcSDE services
  - Applications developed to monitor system usage metrics

Enterprise GIS - Conclusion

- Enable users to retrieve geospatial data in an efficient manner
- Build applications and services which can be utilized by an assortment of clients
- Provide excellent customer service – will provide customers with the knowledge and power to use the GIS data, services and applications

Questions?

Wendy M Turner

Freedom Consulting Group, LLC

wmturne@freedomconsultinggroup.com

www.freedomconsultinggroup.com

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