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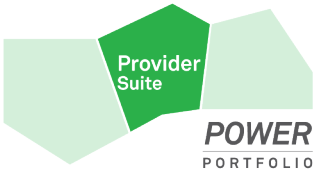

ERDAS APOLLO VECTOR DATA MANAGEMENT

VECTOR DATA CATALOGING AND DISPLAY

White Paper
October 02, 2014

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Introduction

Organizations are generating – and ultimately accumulating - more data than ever before. Geospatial data within an organization may be massive and varied, and could include a wide variety of types and formats. Examples of geospatial data range from large point cloud data sets, as well as basemaps, feature data derived from analysis, location-based points and attributes gathered from smartphones, plus volumes of other associated business documents and associated information. The variety of spatial data types and formats coming into an organization can vary as well as the final formats used within the organization itself; and within one organization, various departments may require the same data in different formats. The mapping department of a state transportation organization may need information in a geographic database, while the engineering department will need the same data in CAD (computer aided design) format. This need for multiple copies of data being shared between disparate groups has led to clutter, chaos and ultimately data storage problems within the organization.

Hexagon Geospatial has a strategy for cataloging, managing and efficiently delivering many types of geospatial data and processes to desktop users and users over the web via Open Geospatial Consortium (OGC®) standards; however, there had previously been a gap when it came to real Vector Data Management. Specifically, a solution was still needed that would enable customers to fully catalog vector data types, regardless of format, through powerful workflows and deliver that vector data in a variety of ways for use in everyday analysis, including download and blended views.

This paper describes how the ERDAS APOLLO offering can be used for complete **Vector Data Management[1] (VDM)** to crawl vector data stores and share data across different applications using OGC WMS, WFS and WFS-T services and download capabilities.

ERDAS APOLLO – A Product Overview

ERDAS APOLLO is a comprehensive data management, analysis, and delivery system. It enables organization and delivery of volumes of many types of file-based, database and web-enabled data, including imagery, feature data, terrain, and virtually any digital object in the enterprise. Implementing an out-of-the-box service-oriented architecture (SOA), the ERDAS APOLLO system can be customized and extended to satisfy an organization's geospatial and business process requirements.

The system embraces Open Geospatial Consortium (OGC) services, making them a native implementation. It is the primary use case for accessing data; implementing comprehensive Web Mapping Service (WMS), Web Map Tile Service (WMTS), Web Coverage Service (WCS), Catalog Service for the Web (CS-W), Web Feature Service (WFS), Web Feature Service-Transactional (WFS-T), Web Map Context (WMC), Web Processing Service (WPS), and ISO 19115/19139 metadata standards.

The ERDAS APOLLO system is a highly flexible solution, integrating into existing workflows. In addition the system allows connections to other Hexagon Geospatial product offerings, as well as integrating with other GIS environments via OGC standards. ERDAS APOLLO leverages existing business systems, such as Oracle, MS SQL and PostgreSQL databases for persisting intelligent metadata and application specific information. Proven IT standards such as Java EE and RESTful Services integrate ERDAS APOLLO into existing business environments, also meeting an organization's security requirements.

[1] ERDAS APOLLO 2014 and its Vector Data Management capabilities are focused on serving Esri Shape, Esri File Geodatabase (FGDB) and GML formats as OGC WMS services. ERDAS APOLLO 2015 incorporates CAD and vector database holdings as well as serving the data as WFS, WFS-T.

Vector Data Management New Features in Recent Releases

For the 2014 release, ERDAS APOLLO added the ability to crawl, catalog and serve vector data as an OGC WMS[2]. With Vector Data Management (VDM), users can better manage their vector data sources and distribute read-only information to a variety of applications, both desktop and web based.

ERDAS APOLLO 2014 enabled OGC services can be stood up on top of a variety of vector data sources. Furthermore, end users are able to ingest the vector information without having to import, convert or otherwise change the original data source. This keeps organizations from having to duplicate the same dataset in a variety of formats. This is considered 'Phase I', which includes the ability to crawl, catalog and serve out Geographic Markup Language (GML) vector files as well as the Esri Shapefile and File Geodatabase (FGDB) formats, and enable data visualizations as OGC WMS. This allows users to view styled vector data as layers in desktop or web-based applications that can consume OGC services.

Besides viewing vector data in an application, ERDAS APOLLO 2014 enabled users with proper permissions to select and download original vector datasets. Additionally, support for vector data within the Clip-Zip-Ship (CZS) workflow will be added in future phases.

For the 2015 release, Computer Aided Drafting (CAD) formats have been added to VDM, enabling the ability to add geographic context to your CAD data and manage those files as geospatial data. Now, end users can easily discover and retrieve CAD data using keyword-based and spatial searches within ERDAS APOLLO. This adds tremendous value to computer aided drafting (CAD) files, produced by various softwares such as Microstation and AutoCAD. In the future, ERDAS APOLLO will provide CAD data as real vector features and support the viewing of CAD data within mapping software as an OGC service.

ERDAS APOLLO 2015 strengthens capabilities even further and now also catalogs geometries stored in databases as well, including Oracle, SQL Server and PostGIS databases.

With the ability to consume multiple vector data types, additional services will correspondingly be made available for data consumption in the future. The automatic configuration of OGC WFS and WFS-T services with VDM will also offer greater functionality to users, allowing them to extract information based on WFS attribute features and in some cases update the vector data source via a WFS-T transaction.

Organizations that create, update, extract, edit and distribute multiple vector layers can maximize their investment of those datasets by implementing ERDAS APOLLO to crawl, catalog and serve the data throughout their organization.

Cataloging vector data files on the network

This white paper focuses specifically on cataloging file-based vector data. From the beginning, the Vector Data Management capabilities of ERDAS APOLLO have always enabled you to leverage the investment Hexagon Geospatial has made towards OGC/ISO standards. Today, users now have the ability to catalog, visualize, navigate, integrate and download vector data in different formats. This level of integration provides superior performance, productivity, and enhanced data management that enables you to meet the emerging challenges of today's geospatial environment.

Features include:

- Automatically discover vector data files on the network

[2] The ERDAS APOLLO 2014 VDM release only supports the WMS standard versions 1.1.1 and 1.3.0 for vector data at this time.

- Catalog vector metadata in a dedicated catalog model
- Catalog databases including Oracle, SQL Server and PostGIS
- For cataloged vector data:
  - Set coarse to fine grain security for access to vector data managed by system
  - Configure basic and attribute based styles for WMS delivery
- Query vector datasets by attributes, dataset metadata (including keywords) or ISO metadata
- View vector data in any OGC capable application via WMS or WFS
- Ability to download original dataset to local system

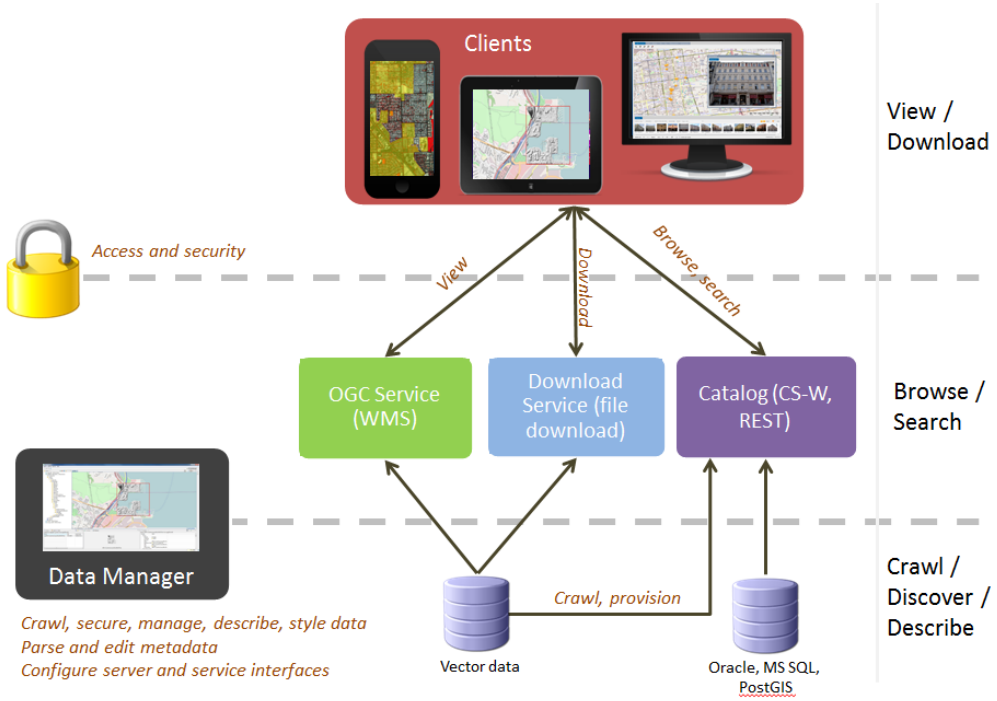
Benefits

By integrating VDM functionality into ERDAS APOLLO, Hexagon Geospatial provides organizations across all geospatial industry segments with the means to organize and immediately deliver even more usable and actionable geospatial information to end user customers. This valuable tool enhances workflows by enabling better overall data management for organizations in infrastructure management, land information management, geospatial intelligence exploitation and production, cartographic production, security, and reporting and analysis.

Benefits include:

- Catalog and manage vector data on the file system, in databases and web-enabled, as well as imagery and other business datasets
- Eliminates end users concerns with file formats
- Provides managers better access control to datasets
- Waste less time looking for data over the network
- Share data with external contractors via easy workflows

Architecture



Vector Data Management – A Case Study

The following case study and workflow is based on ERDAS APOLLO developments for the 2014 release. The workflow in general follows the typical flow from ERDAS APOLLO administration (i.e. crawling, metadata updates etc.) to end user data exploitation (i.e. discovery, view, download use cases).

Overview

Today, organizations have large amounts of vector files that are many times stored in folders, either on the network or sometimes on individual machines of employees. This vector data may be updated on a recurring time frame. Vector data gets used for analysis to create new data, backdrops for the verification of other data, and may also be distributed to others internally or externally. The user of the data needs to be able to review information about the data quickly, for example creation date, content etc. Once identified, the data can then be utilized in a desktop or web application without the need to alter the original format of the data (i.e. import). If required, end users may download the whole file in the original format, or make it available to a third party.

Challenges with managing file-based vector data can include the data being inaccessible, buried in workgroups or hidden on a user's system. Also, metadata may be unavailable or difficult to interpret. Plus, there can be issues with data redundancy – where the same content is duplicated within multiple files and folders, possibly with different creation or update dates.

Workflows

Organizing Vector Files with ERDAS APOLLO

The organization needs to manage large numbers of vector files and also collect necessary metadata about each file, including bounding box (bbox), feature attribute classes contained within, creation date, keywords and other information (e.g. projection information, project number). Managing and bringing all of that information into a catalog scheme must be semi-automatic, with most of the actions being done automatically. The ERDAS APOLLO Data Manager can be utilized to set up automatic discovery functions and for cataloging other pertinent information that cannot be retrieved automatically.

Catalog Workflow

- Crawls designated folder locations (locally on the server or on network) for vector data files
  - Automatically discover vector data files on file system
    - Records file / data name and location to main catalog
    - Can be a one-time discovery session or regularly scheduled occurrence
    - Monitor designated ‘drop-box’ folders for incoming data to catalog
      - One or multiple folders can be monitored
      - Data placed in drop-box folder can be automatically moved to a designated location and then cataloged
      - Third party contractors can upload data to designated location, and ERDAS APOLLO will automatically move and catalog data
        - No need for contractors to access organizations network
    - Catalog vector metadata in a dedicated catalog model
      - Information recorded includes bounding box, projection, dates, feature attributes, etc
    - Organize vector datasets within the main APOLLO catalog hierarchy, together with imagery and multimedia datasets
- Automatically configure the vector OGC WMS as well as thumbnails, footprint, and ISO metadata
- Configure the vector datasets fine-grain and geospatial security for viewing and downloading
- Add or edit metadata to individual datasets or bulk edits to multiple datasets within the data aggregate
- Used to configure basic styles of the vector datasets for display as a WMS
  - Styles are applied to point, lines, and areas

Discover and View Vector Files with ERDAS APOLLO

Once the vector files are indexed within the catalog, end users inside and outside of the organization can carry out the following processes:

- Review what has been placed in the catalog and send update requests to the catalog administrator (if they see changes are needed)

- Use vector data in their daily work, i.e. find information, display it on the map, and combine it with other data that comes either from the catalog or other data sources

Discovery Workflow

- If required, end users log into the ERDAS APOLLO catalog in order to search and view vector data
  - End users may only search and view data they have permission to see, as determined by the organization
    - Security previously applied during data catalog must be in effect
  - End users query the catalog for vector datasets through the Geospatial Portal or through the ERDAS APOLLO Catalog function within the GeoMedia® desktop application
- End users can query on vector dataset attributes, keywords, date or spatial extent
- End users view vector dataset metadata and generated thumbnail
  - Catalog metadata, including the vector datasets attributes
  - ISO metadata
- End users zoom to the vector datasets extent
- End users add vector datasets to the map (through WMS GetMap)

Discover and Download Vector Files with ERDAS APOLLO

Once data has been cataloged and is being served out by ERDAS APOLLO, the organization is able to deliver specific vector data to third party contractors or even the public at-large. Typically, the right set of files is discovered by searching the catalog and/or displaying some of the content in the map. Then the third party user or the general public is able to view or download the data for use.

Download Workflow

- End users query the catalog for vector datasets
  - End users can query on vector datasets attributes
  - End users view the vector dataset metadata
  - Catalog metadata, including the vector datasets attributes
  - ISO metadata
- End users zoom to vector dataset extents
- End users add vector datasets to the map (through WMS GetMap) – to preview the data
- End users download vector datasets source file(s) via simple file download

Results

With the implementation of the ERDAS APOLLO system, the organization is now better prepared to manage large collections of vector data along with imagery and other business data. This capability will help reduce time wasted attempting to find data based on location, project number, date(s), etc. Distribution and viewing of data is simplified with the use of WMS and download capabilities, plus the organization has full control of their data holdings through an advanced security mechanism.

- Relocation and auto-crawl of incoming datasets from third party contractors makes it easier for the organization to receive data
  - Contractor can securely insert data into organization's network
  - Staff does not have to be present to receive data; 24-7-365 capability now exists
- Data management staff can quickly add or edit metadata associated with the vector data
- Data is now more secure and only those with 'need-to-know' have access
- The OGC WMS standard provides a common standard to access data into desktop or web applications
  - No need to import data
  - No need for multiple copies of data in different formats
  - GIS and CAD applications can now share the same views/information
  - Data is delivered over the web to the public via browsers and mobile devices
- Based on need, internal and external users can now search for and download data directly and in original format

With ERDAS APOLLO, the use, distribution and consolidation of vector data has been optimized. This means resources are freed up to make better use of their time, and there is far less complication in managing and distributing all datasets together. Overall, the organization will achieve a more than acceptable return on investment by making use of the ERDAS APOLLO system.

About Hexagon Geospatial

Hexagon Geospatial helps you make sense of the dynamically changing world. Known globally as a maker of leading-edge technology, we enable our customers to easily transform their data into actionable information, shortening the lifecycle from the moment of change to action. Hexagon Geospatial provides the software products and platforms to a large variety of customers through direct sales, channel partners, and Hexagon businesses, including the underlying geospatial technology to drive Intergraph® Security, Government & Infrastructure (SG&I) industry solutions. Hexagon Geospatial is a division of Intergraph® Corporation. For more information, visit www.hexagongeospatial.com.

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