An Open Geospatial Consortium-based Arctic Climatology Sensor Network Prototype

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Study Area: Barrow, Alaska

- "Top of the world", Point Barrow Alaska, is the nations northern most point
- One mile away lies the city of Barrow, the northern most settlement on the continent
- Less than 4,000 people live in the area
- March 2010, The Smithsonian Magazine published an article titled, "Barrow, Alaska: Ground Zero for Climate Change"

Project Objectives

- Create Data Information System
- Use Open Geospatial Consortium (OGC) Standards
- End to End Geographic Information Network

Motivation

- Interoperability
- Scalability
- Extensibility

Ultimately,

internet based stationary and mobile location and time aware sensor networks

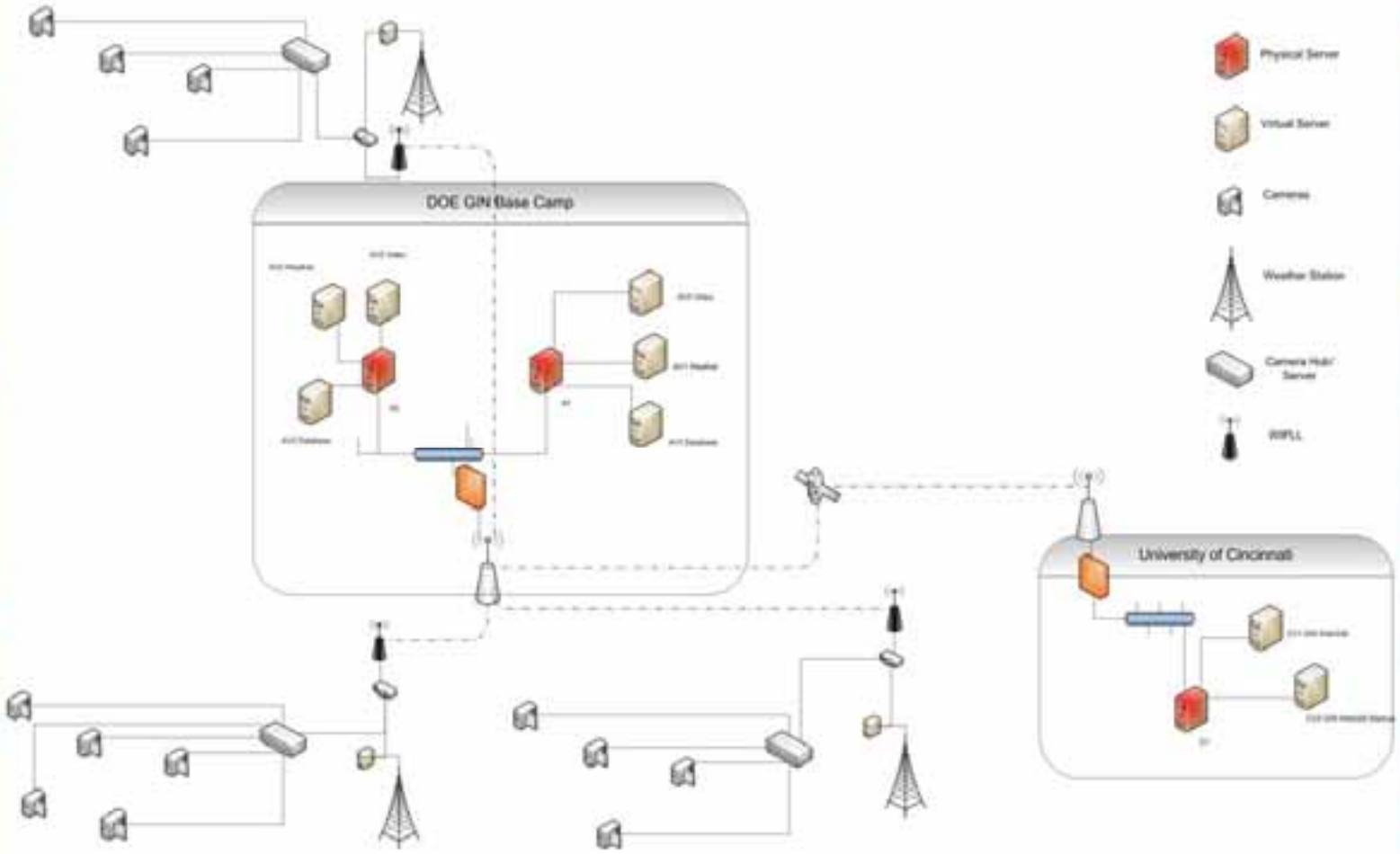
Direction

- TCP/IP
- Microsoft Windows
- File Transfer Protocol
- ESRI, ArcGIS Server
- SQL Server

Partnerships

- INTRUST Group Inc.
- Linoma Software

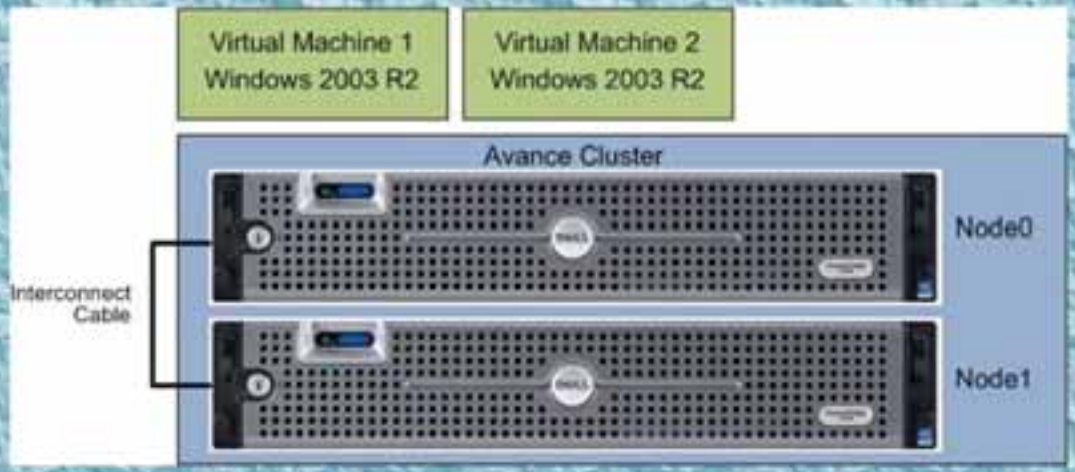
Prototype GIN Network



Remote Server Virtualization

Avance

- High Availability software created by Stratus
- Has Xen Server Virtualization software embedded within Avance



Stratus Technologies

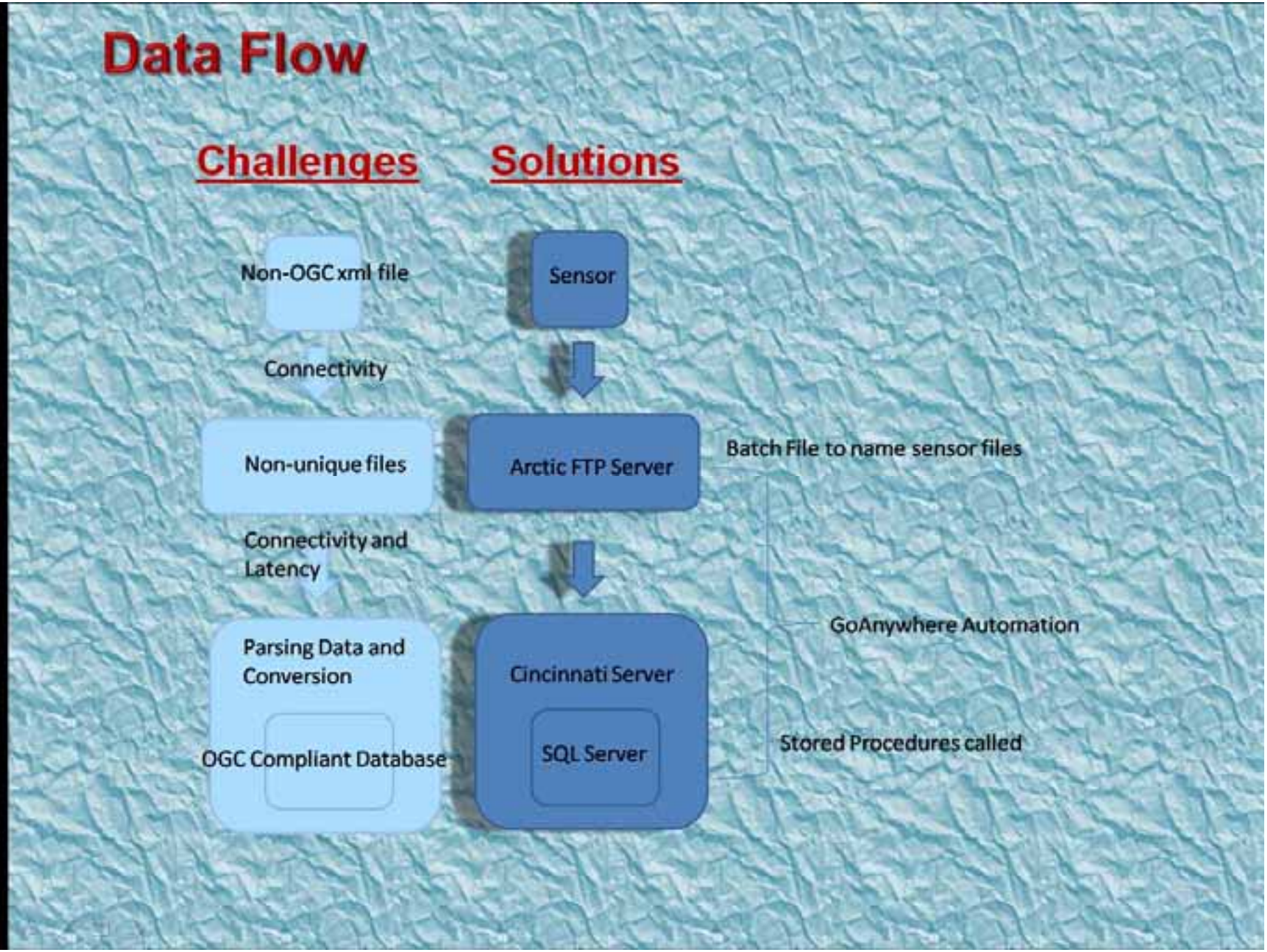
Automated Data Movement

Linoma Software

Go Anywhere Director

streamlines and manages data movement through an innovative centralized approach. It allows your organization to connect to almost any system (internal or external) and securely exchange data using a wide variety of standard protocols.

Data Flow


Challenges
Solutions
Non-OGC xml file
Sensor
Connectivity
Non-unique files
Arctic FTP Server
Batch File to name sensor files
Connectivity and Latency
Parsing Data and Conversion
Cincinnati Server
GoAnywhere Automation
OGC Compliant Database
SQL Server
Stored Procedures called

Original XML File

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- <data timeframe="actual">
    <item sensor="date0" cat="date" unit="utc">20090810234001</item>
    <item sensor="date0" cat="date2" unit="utc">10.08.2009 23:40:01</item>
    <item sensor="date0" cat="puredate" unit="utc">10.08.2009</item>
    <item sensor="date0" cat="time" unit="utc">23:40:01</item>
    <item sensor="date0" cat="year" unit="utc">2009</item>
    <item sensor="date0" cat="month" unit="utc">08</item>
    <item sensor="date0" cat="day" unit="utc">10</item>
    <item sensor="date0" cat="dayofweek" unit="utc">1</item>
    <item sensor="date0" cat="hour" unit="utc">23</item>
    <item sensor="date0" cat="min" unit="utc">40</item>
    <item sensor="date0" cat="sec" unit="utc">01</item>
    <item sensor="date0" cat="date" unit="local">20090810234001</item>
    <item sensor="date0" cat="date2" unit="local">10.08.2009 23:40:01</item>
    <item sensor="date0" cat="puredate" unit="local">10.08.2009</item>
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    <item sensor="date0" cat="hour" unit="local">23</item>
    <item sensor="date0" cat="min" unit="local">40</item>
    <item sensor="date0" cat="sec" unit="local">01</item>
    <item sensor="lunar" cat="phase" unit="percentage">78.2</item>
    <item sensor="lunar" cat="phase" unit="segment">5</item>
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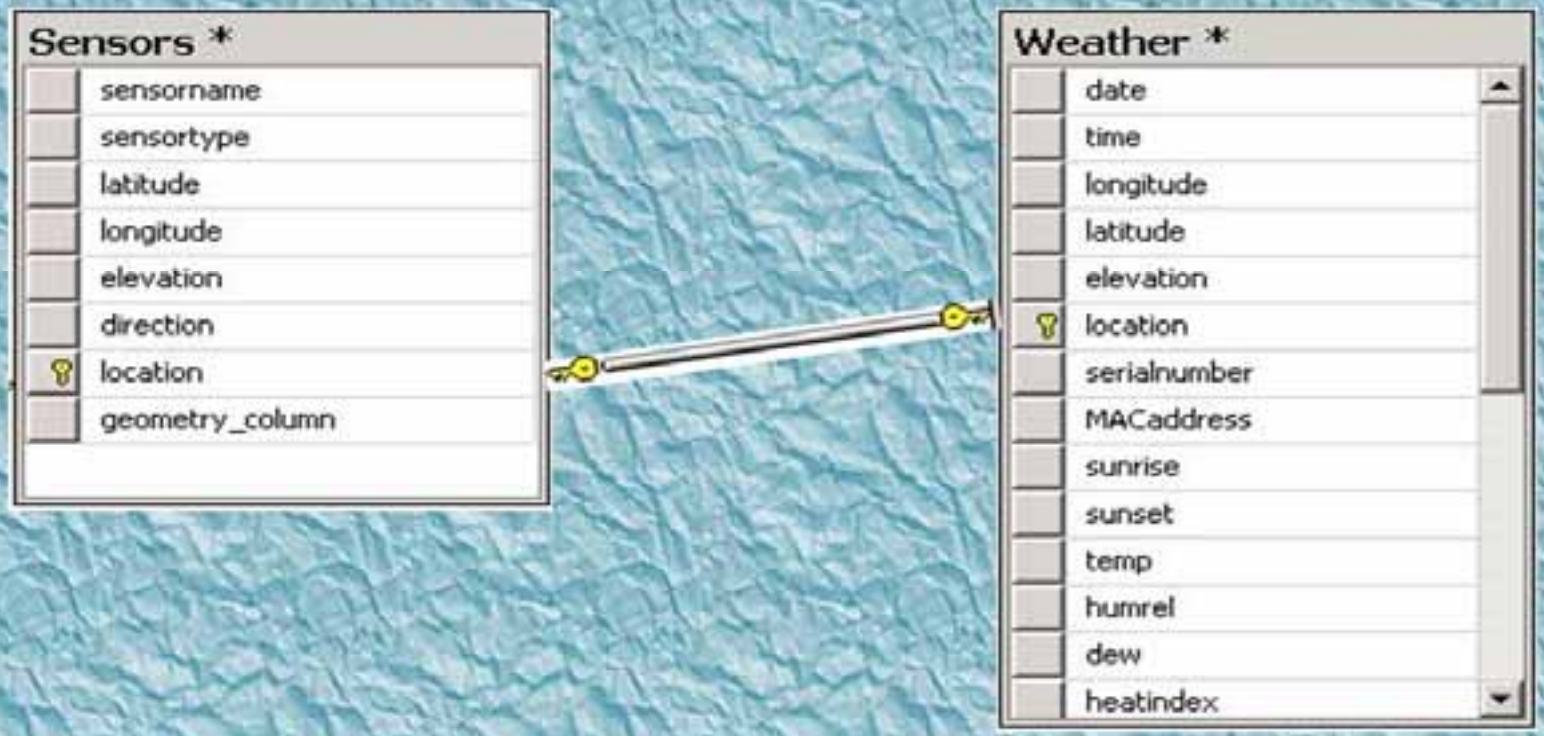
Normalization

Spatial Data Relationship



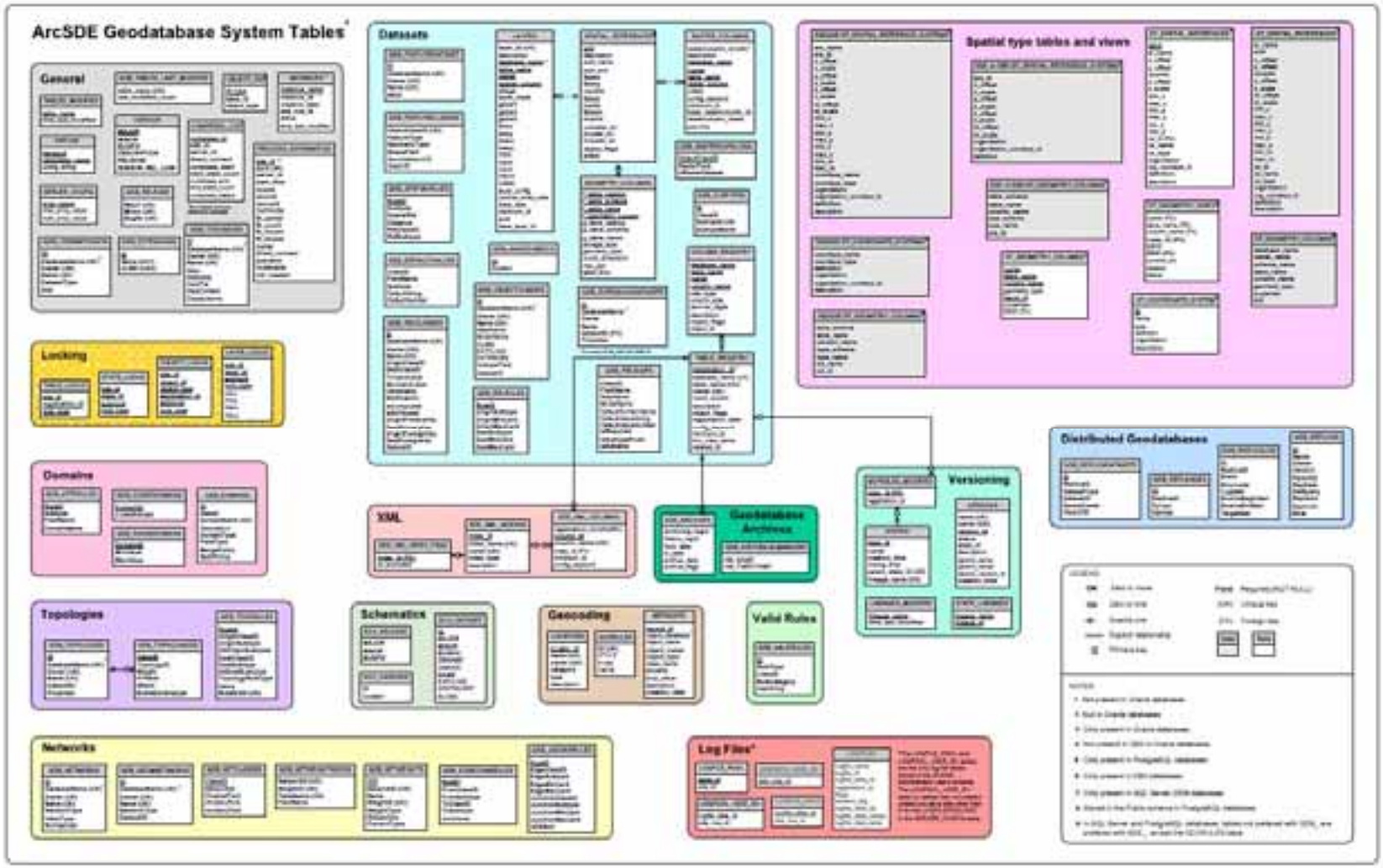
ESRI OGC Participation

Principle Member

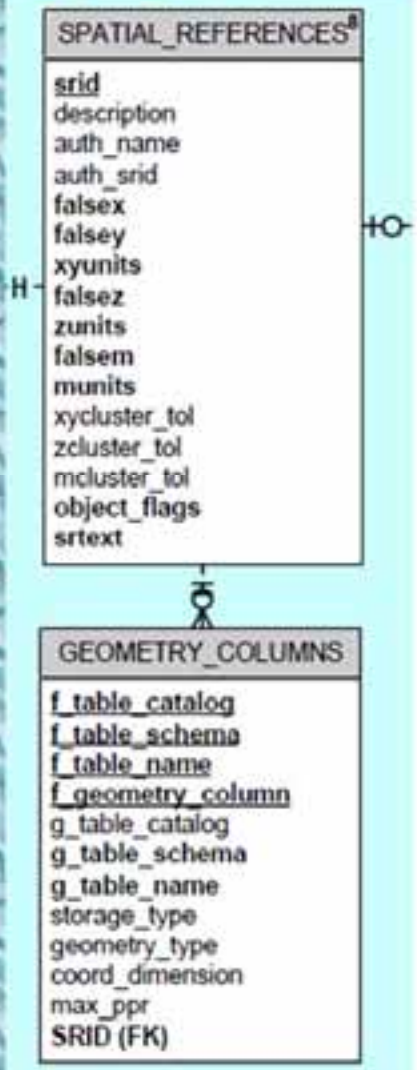
Actively Participates

- -Technical Committee
- - Planning Committee
- -Board of Directors
- -All three OGC programs
  - -Interoperability, Standards, Community
- -Architecture Board
- -Others….

OGC®
Open Geospatial Consortium, Inc.


ArcSDE Geodatabase System Tables*
General
Datasets
Spatial type tables and views
Locking
Domains
XML
Geodatabase Archives
Versioning
Distributed Geodatabases
Topologies
Schematics
Geocoding
Valid Rules
Networks
Log Files*

SDE



OGC

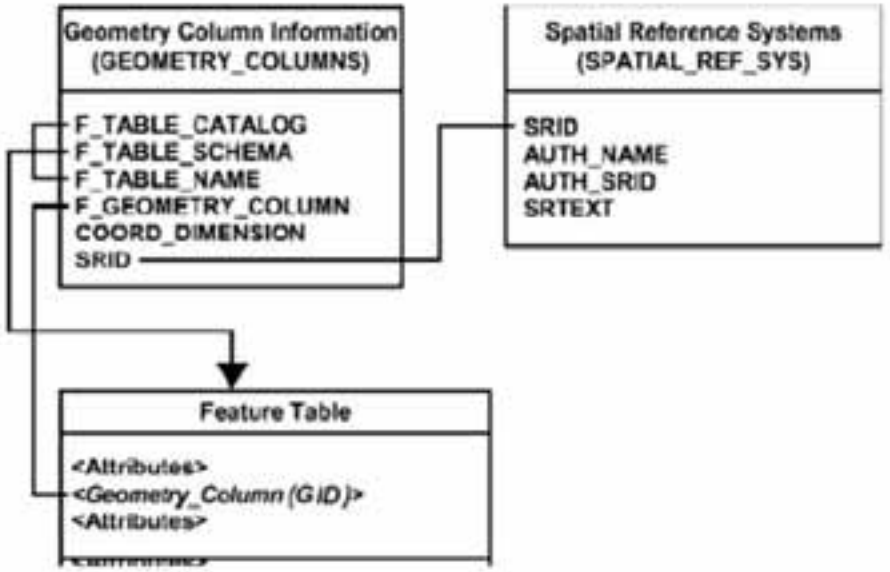


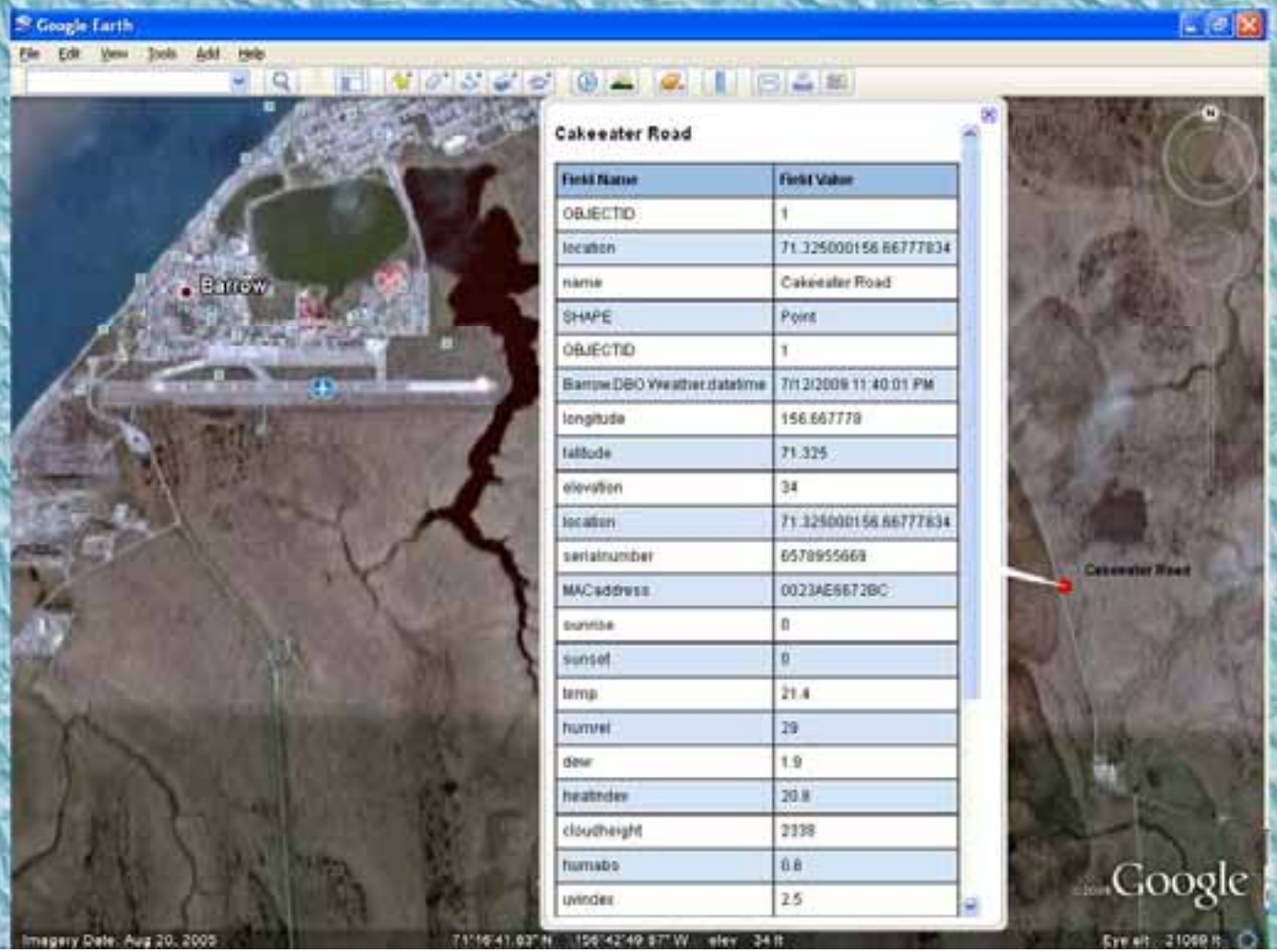
Figure 3: Schema for feature tables using SQL with Geometry Types

CERTIFIED OGC COMPLIANT

Visualization

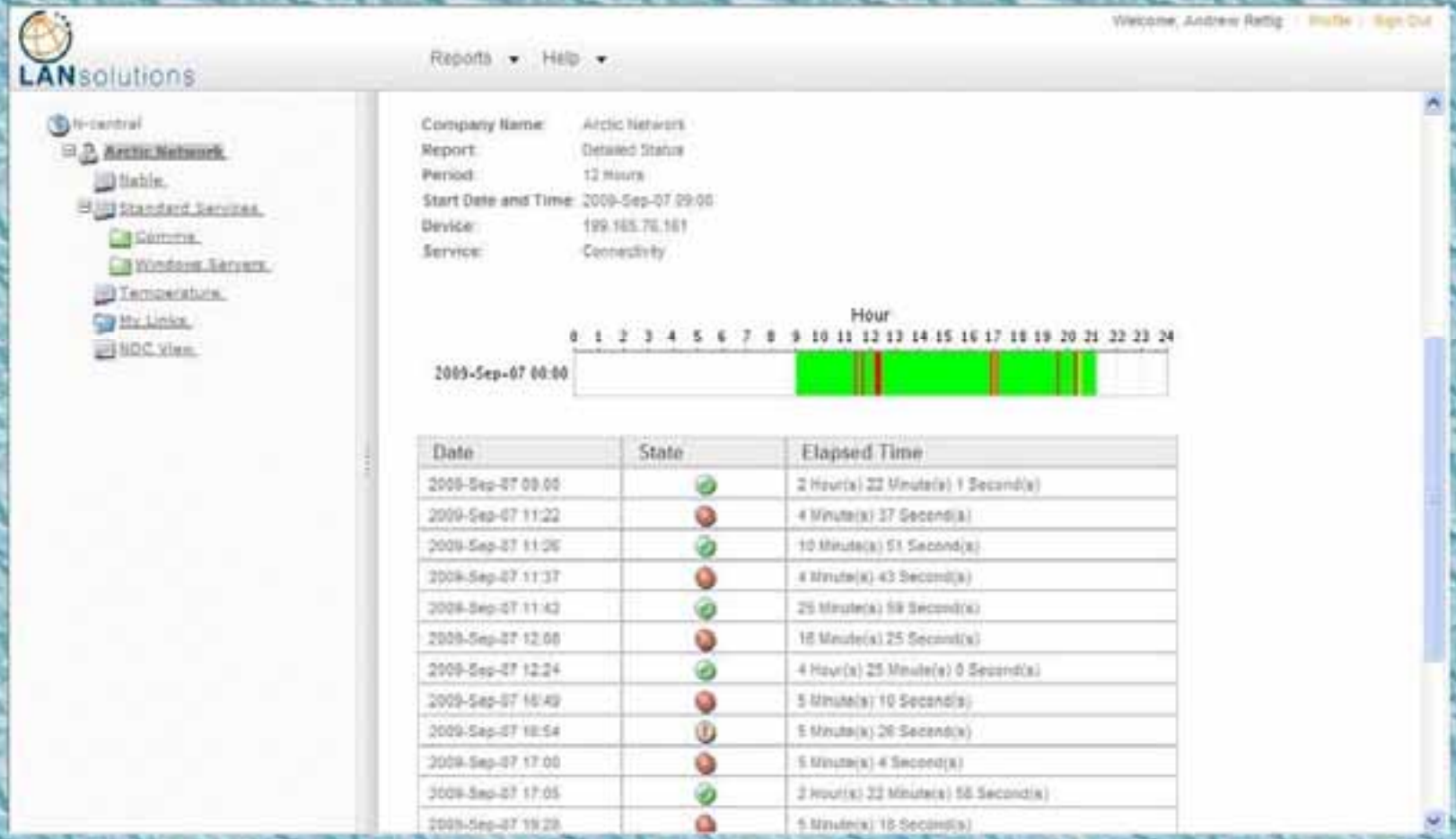
Keyhole Markup Language (KML)

Supported by ArcGIS Server as an output format



Adding Imagery Geoinformatics

Network Monitoring




Questions?