

Web Services and Geospatial Applications:

A Liquid Fuel Pipeline Case Study

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July 22, 2004

Today's Goals

- ◆ Demystify Geospatial Web Services
- ◆ Explore Benefits of Using Web Services in Applications
- ◆ Discuss GIS-specific role for Web Services

Approach

- ◆ “Define” Web Services
- ◆ Discuss Role of Web Services in Developing Applications
- ◆ Use Kinder-Morgan’s Incident Response Application as a Case Study

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WEB SERVICES PROVIDE A PATH FOR ENTERPRISE INTEGRATION

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Developers Are Caught
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SCORING WITH WEB SERVICES

Web services are becoming integral to IT—and to business. Here's how the technology plays in six companies' success strategies.



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What is a Web Service?

The “Quick and Dirty” Definition:

- ◆ A website without a Graphical User Interface (GUI)

No GUI? Consider www.google.com

- ◆ WWW-based Search Engine
- ◆ Simple input
- ◆ Rich result set (hyperlinks, images, etc.)

What if you could design your own User Interface but still use the google search engine?

GOOGLE

Pfizer Inc: The world's largest research-based pharmaceutical company - Microsoft Internet Explorer

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Press Conference on Major Prescription Medicine Access Initiative

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- [July 14, 2004](#) Pfizer Invites Public to Listen to Webcast of July 21 Conference Call with Analysts
- [July 13, 2004](#) Patent Protection Crucial for Next Generation of HIV/AIDS Medicines

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The Underlying Idea

- ◆ Provide useful functions via WWW
- ◆ Take advantage of existing services/data
- ◆ Allow Developers to rapidly create modular applications
- ◆ Developers responsible for GUI

Web Services: Implications for GIS

- ◆ Access to rich Geodatabases
- ◆ Access to Maps, Cartography
- ◆ Access to Geospatial services
(e.g.: Gazetteer, Geocoding, etc.)

Implications for “Non-GIS” Web Developers:

Starbucks Retail Stores - Microsoft Internet Explorer

Address: http://www.starbucks.com/retail/locator/default.aspx

STARBUCKS.COM

our coffees | our stores | starbucks card | in grocery | for business | about us

local events | beverage lineup | nutrition information | brewing equipment | what's happening | hear music | wireless internet | silk is soy

our stores

Find out where we are and what's happening, and tell us what you think

store locator

Where We Are Enter the street address and city. Alternately, you may search by city, state, postal code, or country.

powered by hp

Looking for airport stores or stores that serve lunch? Find this and more by selecting the store type.

Store Type: Retail Stores

Street Address: _____

City: _____

State/Province: _____

Postal Code: 95104

Country: United States

Search Radius: 2 Miles

submit reset

local events

At your Starbucks Explore the Starbucks calendar for programs in your corner of the world - from live music and art displays, to volunteering or a coffee tasting.

- Live Music Hear what musicians in your area are playing.
- Coffee Tastings Sample coffees from around the world with the experts.
- Community Events Become more involved in your community through your local Starbucks store.
- Local Initiatives Starbucks business initiatives in local communities - find out how they could benefit you.

Brewing and machine resource Read the finer details of the brewing, grinding and blending equipment offered in Starbucks stores - from the traditional press to a digital espresso machine. Find online warranty cards, FAQs and PDFs for select owner manuals. Also, discover a trouble-shooting guide developed by our brewing specialists.

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www.start | Microsoft PowerPo... | MapPoint - Micros... | http://download... | Starbucks Retail S... | 2:57 PM

- Access to Specialized Capability
- Develop Once, Use Many Times
- “Computer Neutral” (Unix, Linux, Windows)
- “Language Neutral” (ASP, JSP, .NET, J2EE)

Developers Get:

Starbucks Store Locator - Microsoft Internet Explorer

STARBUCKS.COM

our coffees | our stores | starbucks card | in grocery | for business | about us

local events
beverage lineup
nutrition information
brewing equipment
what's happening
hear music
wireless internet
silk is soy

store locator

United States
The nearest Retail Stores in your area are listed below.

- 199 Fremont @ Howard - SF**
199 Fremont Street
San Francisco CA, 941052227
United States
- 340 Mission**
340 Mission Street
San Francisco CA, 94105
United States
- Spear Street**
201 Spear Street
San Francisco CA, 94105
United States
- 123 Mission Street**
123 Mission Street
San Francisco CA, 94105
United States
- 50 Beale St.**
50 Beale Street
San Francisco CA, 94105
United States
- Hills Plaza**
2 Harrison Street
San Francisco CA, 94105
United States
- 398 Market St.**
398 Market Street
San Francisco CA, 94111
United States
- 333 Market St.**
333 Market Street
San Francisco CA, 94105
United States
- Church & Market - S.F.**
2018 Market Street
San Francisco CA, 94111
United States
- 10.27 Drumm Street**
27 Drumm Street
San Francisco CA, 94111

You can click on the controls to scroll or zoom the map.

Microsoft MapPoint

zoom in | zoom out

start | Inboxes - Micros... | C:_drw\Con... | Microsoft Pow... | MapPoint - Mi... | http://downlo... | Starbucks Sto... | untitled - Paint | 3:36 PM

- GIS without Big \$
- Quick Development
- Modular Applications
- Avoid Data Maintenance
- IT Flexibility
- Standard Platform

What is a Web Service, Revisited

- ◆ Modular Application
- ◆ Published, invoked over WWW
- ◆ Self-Describing
- ◆ Based on accepted IT standards

Case Study: Kinder Morgan Energy Partners

- ◆ Country's Largest Liquid Fuel Pipeline Network
- ◆ 25,000+ miles of pipeline
- ◆ 2,000,000+ bbl/day of fuel
- ◆ 7,800,000,000 cubic ft/day Natural Gas

KMEP's Pipelines Located Across the Country

- ◆ Pipeline easements along railroads
- ◆ Urban corridors
- ◆ Environmentally Sensitive Areas

Leaks Happen...

- ◆ Trains Derail...
- ◆ Cities Grow...
- ◆ Environmentally Sensitive Areas Require Stewardship...

Cost of Leaks is High

- ◆ Flammable Liquid
- ◆ Environmental Cleanup
- ◆ Lost Inventory, Interrupted Pumping
- ◆ Public Relations

Business Objectives: Minimize Leak Response Time

- ◆ Locate Leaks Quickly
- ◆ Dispatch Crews to Incident
- ◆ Find Engineering Data Quickly
- ◆ Fix Pipeline, Document Response Efforts



Find Incident Location by:

Show All - - - Hide All

- Pipeline Number and Milepost
- RR Line Name and Milepost
- Street Information

Address OR Intersection ?

3rd Gilman

City AND State OR Zip

Berkeley CA

GO

Reset Place All Points

Navigate To:

- City
- County
- State

Map Utilities:

- Alignment Drawing
- Printable Map
- Home
- Help

Welcome to the Kinder Morgan Pacific Region Control Center Application

Total Elapsed Time: 0.0000647439

Many Leaks Require Geocoding

- ◆ Several Million street addresses in Region
- ◆ High “Hit Rate” required
- ◆ Very fast response required

KMEP's GIS Resources

◆ GIS Group in Denver, CO

- Oracle, ArcSDE
- Nation-Wide GDT Streets
- All KMEP GIS data

◆ Incidence Response in Orange, CA

- IT Department
- Engineering Drawings (.dwg)

◆ Management in Houston, TX

Initial Geocoding Challenges

- ◆ Poor Performance
- ◆ Unstable
- ◆ Long-term maintenance difficulties

“Skinning the Cat”

To meet Geocoding Requirements Either:

1. Buy Industrial Strength GC Engine and use GDT geodatabase
2. Use Geocoding Web Service

How to Decide?

- ◆ “Internal” Approach: \$30,000 first year cost
- ◆ Web Services Approach: \$1,200 first year cost



Find Incident Location by:

Show All - - - Hide All

Pipeline Number and Milepost

RR Line Name and Milepost

Street Information

Address OR Intersection ?

3rd and Gilman

City AND State OR Zip

Berkeley CA

Navigate To:

City

County

State

Map Utilities:

Alignment Drawing

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Map Scale - 1 : 20,713

Active Feature KMEP Lines



Legend

Selected Features

UPRR MP

Pipeline Features

Pipeline

Pipeline Mile Markers

RailRoad Mile Markers

Stations/Terminals

Geocoding Service

- ◆ ESRI Arcweb Service
- ◆ Established Service Levels, Licensed Uses
- ◆ Available for other applications throughout KMEP

Conclusions

- ◆ Web Services Model works and is cost effective
- ◆ Web Services can provide a flexible and modular solution to GIS problems
- ◆ Effective way for many departments to succeed

Thank You

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