The Geo-Web: Enabling GIS on the Internet

IT4GIS
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In the Beginning

- GIS was independent
- The GIS analyst or manager was typically a one-person shop
- He/she created the data, analyzed the data, and printed the maps

Along Came the Internet

- The proliferation of networks and the Internet caused a chain-reaction
  - GIS data became easier to share
  - Increasingly larger datasets were shared
  - GIS data was stored (self-service) on the network
Old Habits are Hard to Break

- Centralized GIS on the network
  - Clearinghouses
  - One-stop-shops
- Someone was in charge

But the One-Stop-Shop Broke

- What now?
- Re-invent the one-stop-shop
  - There are now more than 100,000 GIS clearinghouses
  - Each state, large agency, and large company
  - Why so many one-stop-shops?
    - "Data incompatibilities"
    - "Data standards"
    - Control issues"

Control Issues and Fallacies

- Protect trade secrets
- Ensure data security
- Retain intellectual property
Prove It!

- IBM
- Boeing
- What do these two examples have in common?
  - Mass-collaboration
  - Open structure
  - De-centralized organization
  (for more, read "Wikinomics")

The Web 2.0

- The Next Generation
  - All about mass-collaboration
  - Mash-ups
  - Synergy
  - Distributed, de-centralized systems
  (for more, read "The Starfish and the Spider")

Collaboration is New?

- *Traditional* collaborations were:
  - A selected team of colleagues
  - Hierarchical in structure
  - Breadth of knowledge relatively narrow

- *Mass-collaboration* is:
  - An open set of contributors
  - De-centralized in structure
  - Breadth of knowledge will be broad
Web 3.0

- Semantic web
  - coined by Tim Berners-Lee, the man who invented the (first 1.0) World Wide Web.
  - Machine-readable Web pages and semantic metadata
  - Support for future AI applications
  - "Turns the Web into one big database"

A Grand Experiment

- Can Web 2.0 and 3.0 concepts be applied to GIS and spatial analysis... spatial problems?
- Can the GeoWeb be built and leveraged to provide real-time decision support?
- A step in this direction:
The Role of GIS (cont’d)

• Use ArcGIS and web services to make geo-spatial data available to everyone
• Transform these data into actionable information to communicate with everyone
• Help build the Geo-Web

Focusing our Role in IT4GIS

• ArcGIS and web services

ArcGIS Enterprise: Architecture

• Requirements:
  – Network connectivity
  – 64-bit Windows Server OS
  – ArcGIS Desktop software
  – ArcGIS for Server software
ArcGIS Enterprise Requires...

- Server hardware
  - Sufficient hard drive space
  - Consider number of expected hits (transactions) when selecting CPU and cache

ArcGIS Enterprise: Architecture (cont’d)

- ArcGIS Pro and ArcGIS Enterprise
  - ArcGIS Pro is your desktop software
  - ArcGIS Enterprise is your server software
  - These software technologies are connected via ArcGIS Portal

ArcGIS Portal

- Server software providing a user interface
  - AGOL is an instance of Portal
- Installed and configured as part of ArcGIS Enterprise
  - (TIP: Use Esri’s Builder tool to make installation/setup easier)
- Designed to support GIS demands of your enterprise
ArcGIS Server is...

- Also part of ArcGIS Enterprise
- Scalable
- Flexible (variety of SDK's [e.g., Java, Flex and HTML5])
- Resulting services are easy for clients to use (easier than ArcGIS Desktop)
- Can be used with or without Portal for ArcGIS

ArcGIS Server can deliver...

- Image services
- Geodata services
- Map services
- Geocoding services
- Indexing/Search services
- WMS Services
- KML Services

Using a Mash-up of Services...

- Map services can be used to deliver web map applications
Image Services

Best Practices
- Serve either:
  - Single image file (e.g., GeoTIFF), or
  - Raster mosaic dataset w/i FGDB

Raster Mosaic Datasets
- A great solution to serve raster data
- Performance
  - Response
  - Cache (no longer needed/used)
  - Overview size
  - Developing a map service from these data

Web Image Layers
- Service produced when publishing raster data from ArcGIS Pro
- Term used for an “Image Service”
Map Services

- Effectively, Map Services (Web Map or Web Layers) are a type of web service to display an ArcGIS Pro map
- Advantages
  - Can include numerous layers
  - Raster and Vector
  - Retains symbology, scale thresholds, and other settings
    (note: images with ColorMaps, served as image services, will retain symbology also)

Process of creating an ArcGIS Web Application

1. Author a map
   - Using ArcGIS Pro
2. Create your project’s Web Map or Web Layer Service
3. Create a Web application

In IT4GIS...

- Our exercise will give you experience with:
  - Image services
  - Map services
  - And later, Web map applications
Web 2.0 and 3.0 Revisited

• It should be clear how the GeoWeb fits and supports the concept of Web 2.0
• How might it support the semantic web? (Web 3.0)
  – Two minute write!

Key Concepts

• GIS is everywhere
• The Internet is a great way to deliver GIS
• Today –and in the future- web enabled GIS will be increasingly important
• Students need to know the fundamentals of serving GIS data and maps on the web and the practical application of this technology

Questions...Assignment

Demo...connecting to Portal