GeoDataShare - Spatial SOA
CityMap – Web 2.0 mapping

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New York City Technology Forum
A Government Technology Executive Leadership Forum
Presentation Roadmap

- Objectives
- Infrastructure
  - Internet
  - Intranet - GeoDataShare
- Issues with Current SDLC Model
- Why SOA? A strategic decision
- Current Status
- New York CityMap
Objectives

To provide a brief overview of the GIS intranet hosting architecture (GeoDataShare) which serves as the starting step in establishing Spatial Service-Oriented Architecture.

Demonstrate New York CityMap a WEB 2.0/Ajax based web mapping application.
Goals

To move away from Manual Processes

To Automated Processes
Goals

To move away from

Undocumented Processes

To

Documented and Repeatable Processes
How?

• By reducing variability

• Sources of variability:
  – Poor Design
  – Skills and Behaviors
  – Unstable products/systems
  – Insufficient process capability
Internet applications

- DoITT – New York CityMap
- DoITT - My Neighborhood
- DoITT - Poletop Manager
- DoITT - Map Portal
- OPS - My Neighborhood Statistics
- OEM - EMOLS
  - Hurricane Evacuation
  - Cooling Centers
- DSNY - Collection Schedule
- DCP - Census Fact Finder
- DCP - Address Translator
- DPR - Wood Debris
- DPR - Parks Locator
- NYCHA - Internet Mapping
- BOE – Pole site Locator
Intranet applications

- Department of Finance – PARM
- Department of City Planning – GOAT
- NYC GIS Data Download Portal
  - Metadata Explorer
  - SharePoint portal
- 311 – Pseudo-web service to broker address validation and geocoding requests
Software Development Life-Cycle

- Development
- Test
- Staging
- Production
- Disaster Recovery
Sample App. Dev. Scenario

**DoITT**
- Unit Test
- Migrate to STG
- Integration/Functional Tests
- Performance Tests
- Security Scans
- Deploy to PRD
- Deploy to DR
- Monitor/Maintain

**Agency**
- Obtain Hosting Guidelines/Code Samples
- Inform DoITT of the intention to host
- Design Application
- Develop Application
- Unit Test
- Internal Review/Approval
- Obtain Functional Test Scripts sample
- Write Functional Test Scripts
- Migrate to DEV
- Notify Agency of Successful Migration
- Migrate to TST
- Notify Agency
- Migrate to STG
- Integration/Functional Tests
- Security Scans
- Deploy to PRD
- Deploy to DR
- Monitor/Maintain
25 Sun Servers

DEV, TST, STG, PRD and DR

24x7 Operation

Shared Unix Services
Reverse Proxy

Tier #1

Only allows requests to specific URLs to pass through
Web/ArcIMS App Server

ArcIMS load balancing
Java Connector,
App. logic (Servlet, JSPs)

Tier #2

ArcIMS Spatial Server
ArcIMS Spatial Server
ArcIMS Spatial Server
ArcIMS Spatial Server

Oracle 9i
ESRI ArcSDE 8.3

Oracle 9i
ESRI ArcSDE 8.3
Spatial Servers

Most CPU intensive components
Two ArcIMS instances per server
2 CPU servers

Tier #3

Oracle 9i
ESRI ArcSDE 8.3

db1

15K Domain
8CPUs - 1GHz x 16GB RAM
PASSIVE

Sun Fire 15K

Oracle 9i
ESRI ArcSDE 8.3

db2

15K Domain
8CPUs - 1GHz x 16GB RAM
ACTIVE

Sun StorEdge 6910
(shared storage)
Database/SDE Servers

Tier #4

Sun StorEdge 6318
(shared storage)
19 new Sun Servers

new PRD and DR environments

Shared DEV, TST, STG environments
Application Server (J2EE)

Map and Geoprocessing Tier

ArclMS Map Servers and ArcGIS SOCs

Geoprocessing Tier
Map Server - ArcMS

- Sun Fire V240
- 2 CPUs – 1.5GHz
- 4GB RAM
- 2 x 90GB Disks

Geoprocessing Tier
SOC-ArcGIS Server

- Sun Fire V240
- 2 CPUs – 1.5GHz
- 8GB RAM
- 2 x 300GB Disks

Database Tier
Oracle Spatial/SDE

- Oracle 10g
- ESRI ArcSDE
- DB1

15K Domain
- 8CPUs - 1GHz x 16GB RAM
- PASSIVE (Portal Active)

15K Domain
- 8CPUs - 1GHz x 16GB RAM
- ACTIVE (Portal Passive)

Sun Fire 15K (MetroTech)

Oracle 10g
ESRI ArcSDE
DB2

Storage: SAN
Database Tier

Oracle 10G Enterprise Edition
ArcSDE 9.1

Oracle 10g
ESRI ArcSDE
DB1

15K Domain
8CPUs - 1GHz x 16GB RAM
PASSIVE
(Portal Active)

Sun Fire 15K (MetroTech)

Storage: SAN

Oracle 10g
ESRI ArcSDE
DB2

15K Domain
8CPUs - 1GHz x 16GB RAM
ACTIVE
(Portal Passive)
Infrastructure Software

• Internet:
  - Sun Java System Web Server 6.1
  - ESRI ArcIMS 9.1 SP1
  - ESRI ArcSDE 9.1 SP1
  - Oracle 10G Enterprise Edition (Spatial)
  - Solaris 8

• Intranet:
  - Sun Java System Web Server 6.1
  - BEA WebLogic Process Edition 8.1
  - ESRI ArcGIS Server 9.1
  - ESRI ArcIMS 9.1 SP1
  - ESRI ArcSDE 9.1 SP1
  - Oracle 10G Enterprise Edition (Spatial)
  - Solaris 10

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Software Development Tools

• IDEs:  
  – Eclipse (WTP),  
  – BEA Workshop (BPM – JPDs)

• Data Management  
  – ArcCatalog,  
  – TOAD,  
  – Oracle SQL Developer

• Testing  
  – Mercury Load Runner  
  – Mercury Quick Test Professional  
  – Junit, Jsunit

• Misc tools and frameworks: Ant, Tomcat, CVS, Spring, Struts, Hibernate, etc…
Issues with Current SDLC Model

- Hosting multiple application silos
- Data duplication – maintenance issues
- Duplication of efforts - Code reuse
- Cost, project duration
- Proprietary APIs
- Point-to-Point integration
- Change Management
Issues with Current SDLC Model

- Increasing demand for services: City Agencies want new applications built that are better, faster
- Increasing Complexity, 44 servers to manage
- Islands of information: multiple versions of same data
- Time to deployment
- Learning Curve
Automated Deployment Scripts
AXL deployment
Why SOA? A Strategic Decision

- Agility
- Flexibility
- Enables innovation
- Exposes GIS functionality to non-GIS users
Benefits of SOA

• Reduce time to market for new services
  – Focus on delivering unique business logic
  – Enable the creation of composite applications by integrating one or more services
  – Allow services to be choreographed using BPM

• Reduce total cost of ownership of IT infrastructure and business services
  – Shared service infrastructure

• Business driven application development
SOA Gartner’s Hype Cycle

Source: Gartner (August 2005)
SOA Gartner’s Hype Cycle

Source: Gartner (July 2006)
SOA

Composite Applications

Presentation Services

Shared Business Services (BPEL)

Information and Access Services

Data Services

Spatial Data Services

Enterprise Service Bus

Common Services

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Current Status

- Project approved
- System architecture reviewed
- Intranet infrastructure built
- First phase completed September 15, 2006
- Second phase – enable geospatial data services - February
GeoDataShare Goals

- Host intranet ArcIMS applications – In progress
- Host intranet GIS applications - DONE
- Replace intranet GIS data repository - DONE
- Provide agencies with access to live data using OGC services – In progress
- Enable ‘real-time’ geospatial data update and distribution – In progress
Next Steps

• Develop granular web services:
  – Address validation/Geocoding
  – Building information
  – Geopolitical data (geospatial data services)

• Create composite services

• Use on internal applications

• Publish on Citywide UDDI directory (when available)
New York CityMap

- Google map raised the standards for mapping applications
- Small/slow maps no longer acceptable
- Users expect large maps, interactive and responsive applications
New York CityMap

 Users wanted to:
- Be able to browse the map without entering address
- View administrative boundaries
- Search by address and intersection
- Be able to find nearest Point of Interest
- Find more information about Subways
Ajax web application model

Source: http://www.adaptivepath.com/images/publications/essays/ajax-fig1_small.png
Ajax web application model

classic web application model (synchronous)

Ajax web application model (asynchronous)

Source: http://www.adaptivepath.com/images/publications/essays/ajax-fig1_small.png
CityMap Data

- Buildings: > 986000
- Tax Lots: > 850000  (Pluto – DCP)
- Points of Interest: > 9500
- Administrative Boundaries: 10
- Live links to other City Applications: 10
- Elected Officials
Points of Interest

• Transportation
  – Subway Station
  – Subway Entrance
  – Ferry Terminal
  – JFK Airtrain Station
  – Long Island Rail Road
  – Metro North Rail Station
  – PATH Station

• Education
  – After School Program
  – College/University
  – Head Start Program
  – School

• Public Safety
  – Fire House
  – Police
Points of Interest

• Resident Services
  – Day Care Center
  – Hospital
  – Post Office
  – Senior Center

• City Life
  – Cultural Center
  – Green Market
  – Library
  – Park
  – Recreation Center
  – Wifi Hotspot
Technologies

- Solaris, Oracle Spatial, ESRI ArcIMS, ESRI ArcSDE, Sun Java System Web Server, ESRI ArcMap/ArcInfo
- Java 1.4, Spring framework
- DWR – Direct Web Remoting (Ajax)

- 265645 image tiles
Administrative Boundaries

- Borough
- Zip Code
- School Instructional Region
- School District
- Fire Company
- Police Precinct
- Landmark District
- Business Improvement District
- City Council District
- Community Board
Next Steps

- Add bus routes
- Improve Map quality
- Add street directions
- Implement multi-modal routing (directions)
- Add new points of interest
- Update Ortho photography (when available)
Screen Shots

- New York Marriott Brooklyn
  333 Adams Street
  Brooklyn, NY 11201
Questions?

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