Introduction

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Audience

• Audience
  - Architects
  - Developers
  - Administrators
  - Project Managers

• Level:
  - Beginner / Intermediate
ArcGIS Platform
ArcGIS Platform
ArcGIS Online

A SaaS offering for sharing and collaboration of geospatial information

ArcGIS for Mobile

ArcGIS for Desktop

ArcGIS Explorer

Rich Internet Clients

ArcGIS Online

Server

Data Tier
Portal for ArcGIS

A COTS Software for sharing and Collaboration of geospatial information within your Organization

ArcGIS for Mobile

ArcGIS for Desktop

ArcGIS Explorer

Rich Internet Clients

Portal For ArcGIS

ArcGIS for Server

Data Tier

Esri UC2013 - Technical Workshop - Creating an Effective GIS Technology Strategy
Choosing the option that's right for you
Architecture design process
The Open Group Architecture Framework

http://www.opengroup.org/togaf/
Phase C: Application Architecture

A Complete Integrated System

Data Management
- Collect, Organize, & Exchange Data
  - Geodatabase

Planning & Analysis
- Transform Data Into Actionable Information
  - Geoprocessing

Field Mobility
- Get Information Into and Out of the Field
  - Mobile

Operational Awareness
- Disseminate Information Where and When it is Needed
  - Web api’s

Constituent Engagement
- Get Feedback and Make Informed Decisions
  - Web api’s Geodatabase

Desktop

Server

Online
Phase D: Technology Architecture

- Physical infrastructure
- IT standards
- Hardware capacity
- Hardware redundancy
Architecture
topology options
Centralized Architecture

- Single data center = lower cost
- Performance depends on network: good bandwidth and low latency
Performance factors
Network transport time

• Required bandwidth:
  - Response size (Mb)
  - Throughput (req/hr)

\[ Mbps = \frac{TH \times Mbits / req}{3600} \]

• Network transport time:
  - Response size (Mb)
  - Effective bandwidth

\[ Transport(sec) = \frac{Mbits / req}{Mbps - Mbps_{used}} \]

No need to calculate it manually, System Designer Tool does it for you.
Demo

System Monitor – Network Speed Test (available on arcgis.com)
System Designer
Solution Architecture design tool

- Gathering requirements
- Designing
- Capacity: CPU, Network, Memory
- Reporting
System Designer
Provides solution templates for quick analysis
Demo: System Designer Network Analysis
(available on arcgis.com)
Performance Factors
Network transport time

- Impact of service and return type on network transport time
  - Compression
  - Content, e.g., Vector vs. Raster
  - Return type, e.g., JPEG vs. PNG

<table>
<thead>
<tr>
<th>Application Type</th>
<th>Service/Op</th>
<th>Content</th>
<th>Return Type</th>
<th>Mb/Tr</th>
<th>56 kbps</th>
<th>1.54 Mbps</th>
<th>10 Mbps</th>
<th>45 Mbps</th>
<th>100 Mbps</th>
<th>1 Gbps</th>
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<tbody>
<tr>
<td>ArcGIS Desktop</td>
<td>Map</td>
<td>Vector</td>
<td>ICA Comp</td>
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<td>178.571</td>
<td>6.494</td>
<td>1.000</td>
<td>0.222</td>
<td>0.100</td>
<td>0.010</td>
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<tr>
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<td>Map</td>
<td>Vector+Image</td>
<td>ICA Comp</td>
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<td>0.649</td>
<td>0.100</td>
<td>0.022</td>
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Distributed Architecture

- Good performance-local application and data
- Might require complex replication and synchronization process
- Multiple datacenters = higher costs

# Data replication considerations

<table>
<thead>
<tr>
<th>Requirements</th>
<th>GDB Replication</th>
<th>FGDB copy/paste</th>
<th>RDBMS Replication</th>
<th>RDBMS clone</th>
<th>Disk Block-level</th>
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<tbody>
<tr>
<td>Geopgraphic area and selected layers</td>
<td>✓</td>
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<td>✓</td>
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<tr>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Near Time</td>
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<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Downtime: 0</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Downtime: 5-60 min</td>
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<td></td>
<td></td>
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<td>✓</td>
</tr>
</tbody>
</table>

1- 3rd party product integrated through Esri API

2- Consider disconnected synchronization if network has high latency
Application deployment options
ArcGIS Desktop deployment options
LAN – standard deployment
ArcGIS Desktop deployment options

WAN – Citrix compression

Performance depends on image compression and bandwidth.

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Smartphones and Tables
Feature Service

iOS

Microsoft Windows Phone

Android
COTS vs. custom

ArcGIS Online for Organizations

Operations Dashboard for ArcGIS
ArcGIS Server Web Applications
Integrate with Portal for ArcGIS

• ArcGIS API for Silverlight
  • http://resources.arcgis.com/en/communities/silverlight-api/

• ArcGIS API for Flex
  • http://resources.arcgis.com/en/communities/flex-api/

• ArcGIS API for JavaScript
Integration

Esri Maps for Office

Esri Maps for SharePoint
Environments
System Environment Types

- **Development Systems**
  - Reflect Production as closely as possible but without full scalability

- **Production Systems**
  - Network Load Balancer
ArcGIS Server
Single ArcGIS Server machine
ArcGIS Server

High availability configuration
Geodatabase deployment options
Which database to select?
Follow your IT standards, expertise and cost

- DBMS impact on overall performance is typically low
- < 20% of total response time

Low Complexity Map: Throughput vs. data source

Throughput (Tr/Hr)

Data source: FGDB_Local_URL, SHP_Local_URL, Ora11g_AS_URL, SQLSvr_AS_URL, Postgres_AS_URL
Geodatabase editing
Production and Publication

• Pros:
  - Better security
  - Improved performance
  - Additional capacity

• Cons:
  - Requires replication
  - Additional hardware
Geodatabase editing
Internal and external web editing
Data management strategy

In Cloud

On-premises User

Public Or Private

ArcGIS Desktop

ArcGIS Server

ArcGIS Server 1

ArcGIS Server 2

ArcGIS Server 3

ArcGIS Server n

Publication & Visualization In Cloud

Data Management
Data Publication & Analysis In Cloud
Security
ArcGIS Server 10.1
Single firewall

- Port 80 opened
- GIS and data server reside in the secure internal network
ArcGIS Server 10.1
Integrating an existing proxy

- To select your port, install the Web Adaptor on another web server
Hardware for Enterprise GIS
Selecting right hardware
Most Enterprise GIS solutions are CPU bound

- CPU
- Network bandwidth
  - and latency
- Memory
- Disk

Most well-configured and tuned GIS systems are processor bound.
Hardware benchmarks
CPU Processor Speed – Specrate.org

[Image of SPEC® CINT2006 Result]

http://www.cpubenchmark.net/cpu_list.php
Hardware virtualization

- Performance depends on configuration and implementation
- Overhead: 0-30%

Overburdened VMs will incur significant performance degradation
Demo

System CPU
Cloud options
Cloud deployment options

Internal site

External users

VPN

Private Virtual Cloud

VPN

Portal for ArcGIS

ArcGIS Online
- Portal for ArcGIS
- Tile and Feature Services

Esri Managed Services
- ArcGIS Server
- Geodatabase

Public users
Esri Cloud Hosting Options

Provided by ArcGIS Online and Esri Managed Services

**ArcGIS Online**
- Web Mapping Platform
- Ready-to-Use Content
- Feature Services
- Tiled Map Services
- Developer API

**ArcGIS Online + Advanced GIS Services thru Managed Services**
- ArcGIS Online, plus...
  - Imagery Services
  - Dynamic Map Services
  - Analysis Services
  - Custom App Hosting

**Turnkey GIS Hosting with Managed Services**
- Full Service Hosting
- System Design
- Backup and Archive
- Data Management
- 24/7 System Monitoring

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Self Service  |  Full Service
Deployment Patterns

Flexible offerings to support a variety of needs
Leveraging the Cloud – Security & Control

Public Cloud

Private Cloud

Security & Control

LESS    MORE
Enterprise GIS Monitoring options
System Monitor

- 2 CPU cores
- 2 G RAM
- 50 G Disk

Target environment
- Local Agent (optional)
- Host with local Agent (no passwords required)
- Host with remote access
- ArcGIS Server
- Geodatabase
Demo
System Monitor – Enterprise GIS monitoring tool
Tools

- System Designer
  - http://www.arcgis.com/home/item.html?id=8e655b38f2fc4b778d07dd34f436a978 (MS 2013)
- System Test (Beta)
  - http://www.arcgis.com/home/item.html?id=e8bac3559fd64352b799b6adf5721d81
- System Monitor (Beta)
  - http://www.arcgis.com/home/item.html?id=848f48b0f88e4de7a036377197453efe
- System CPU
  - http://www.arcgis.com/home/item.html?id=3e473b63a3254a6ab5f22e6f9608b209
Thank you…
Andrew Sakowicz
asakowicz@esri.com

Please fill out the session evaluation

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