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Technical Workshop

Enterprise GIS Architecture Deployment Options

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Introduction

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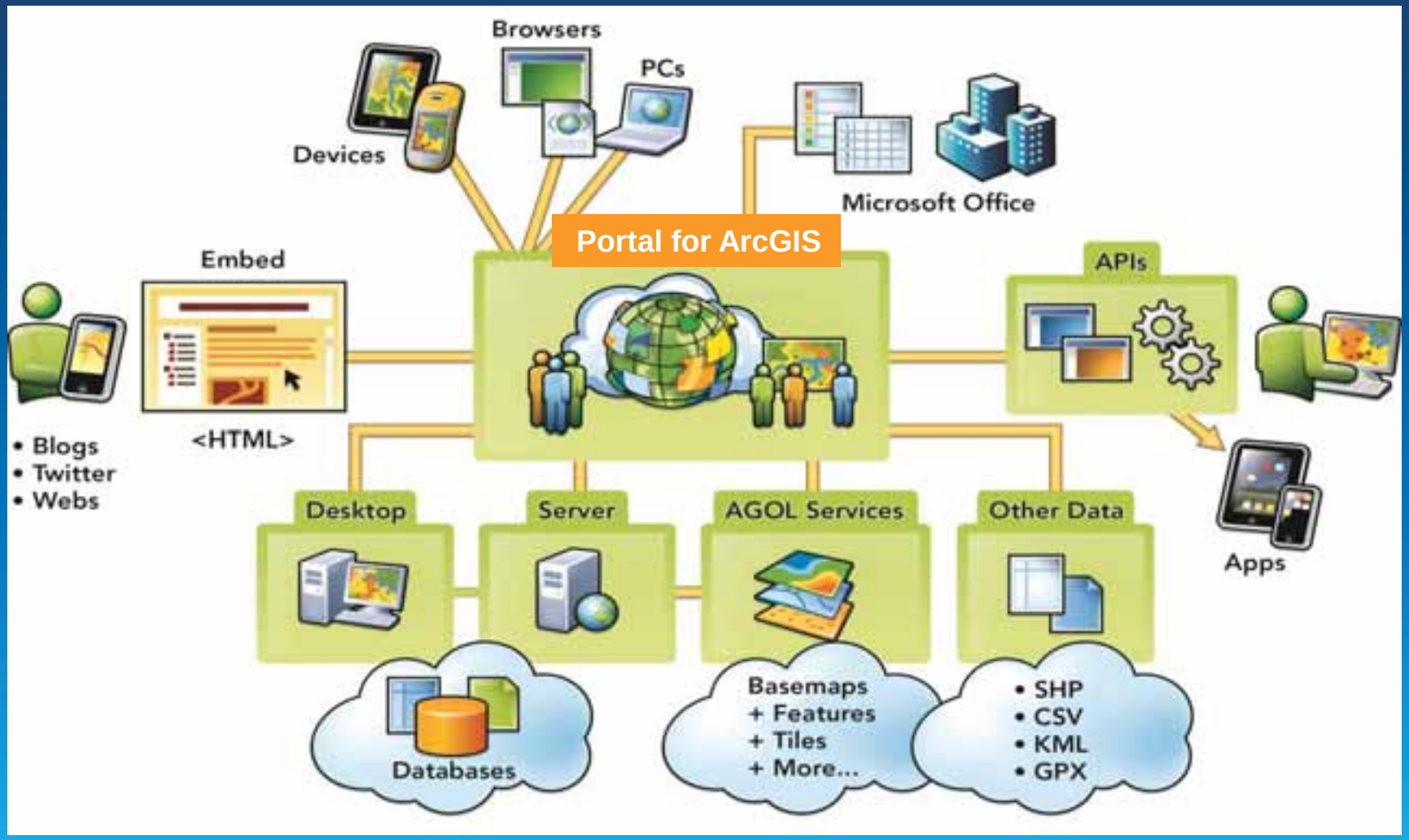
Audience

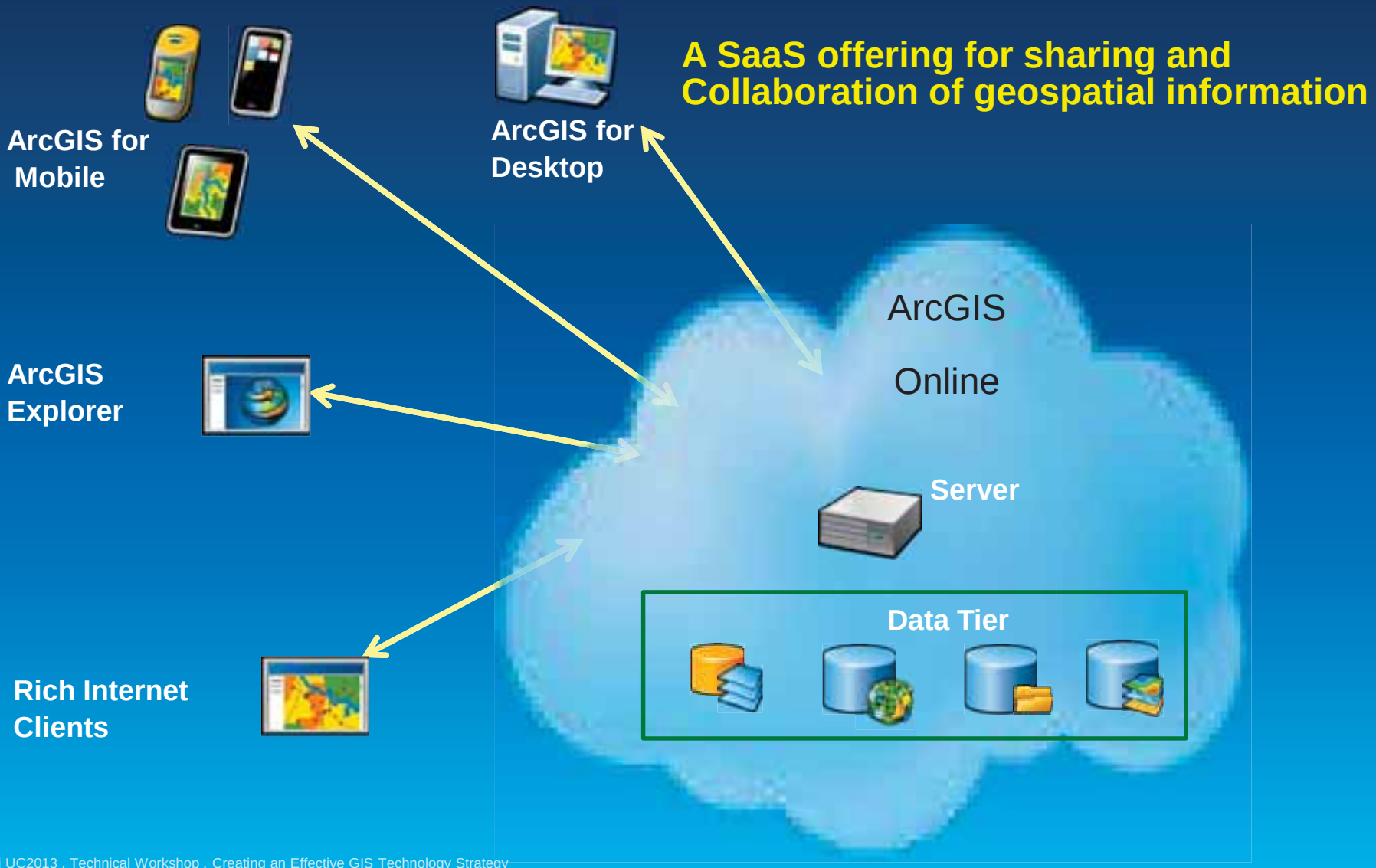
- Audience
  - Architects
  - Developers
  - Administrators
  - Project Managers
- Level:
  - Beginner / Intermediate

ArcGIS Platform

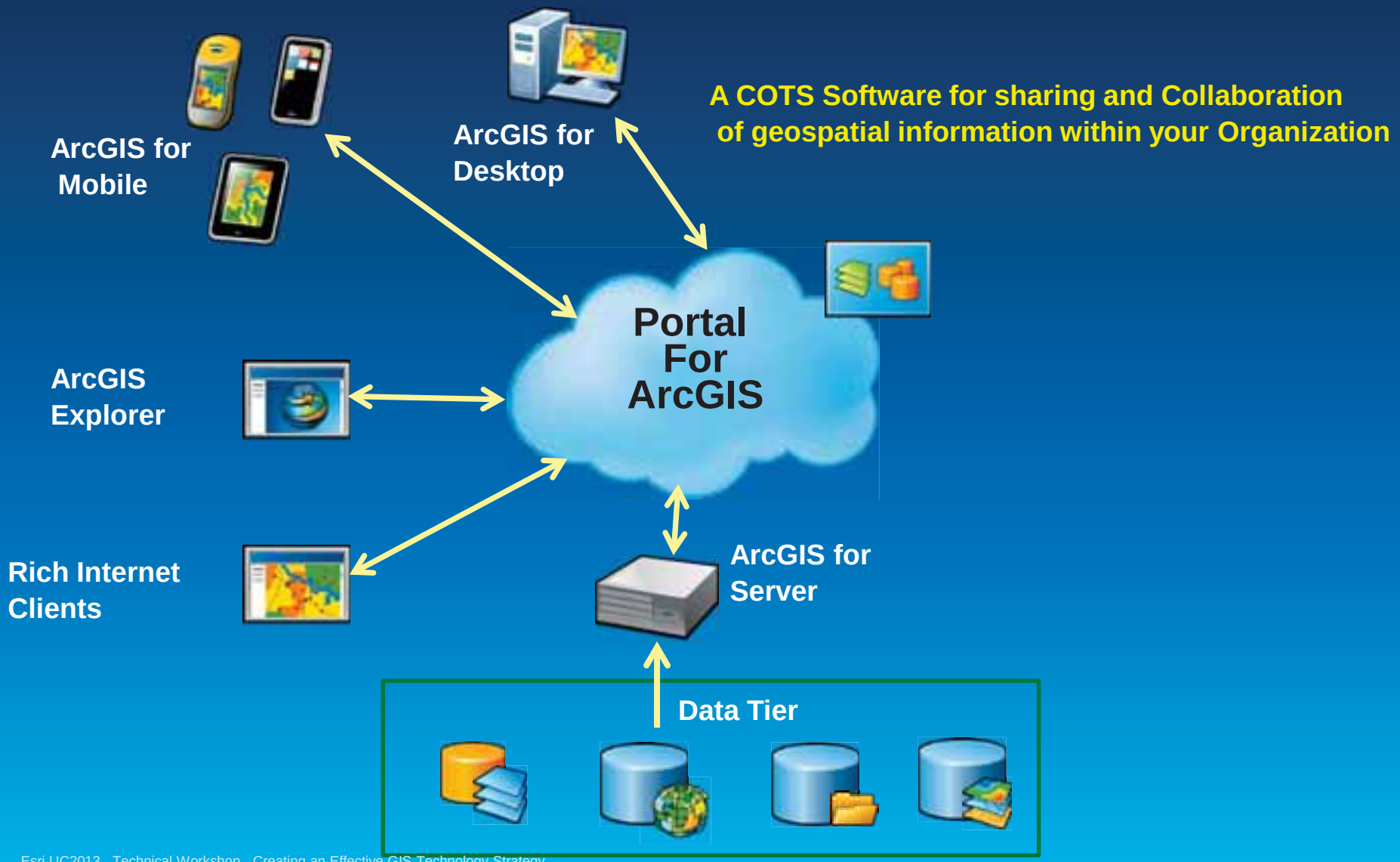
ArcGIS Platform



ArcGIS Online



Portal for ArcGIS



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

Data Management	Planning & Analysis	Field Mobility	Operational Awareness	Constituent Engagement
Collect, Organize, & Exchange Data	**Transform Data Into Actionable Information**	**Get Information Into and Out of the Field**	**Disseminate Information Where and When it is Needed**	**Get Feedback and Make Informed Decisions**
Geodatabase	Geoprocessing	Mobile	Web api's	Web api's Geodatabase

A Complete Integrated System

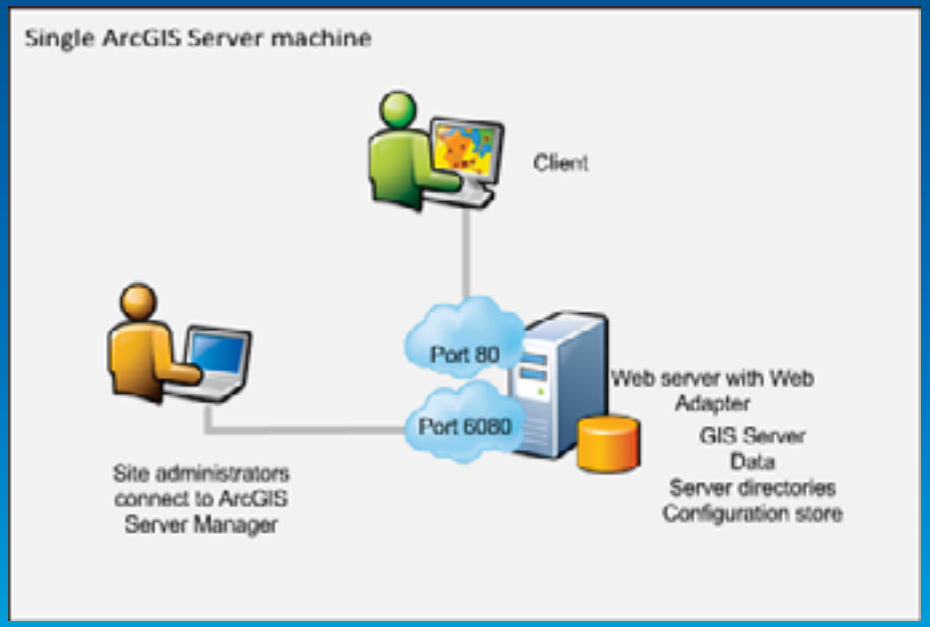
Desktop

Server

Online

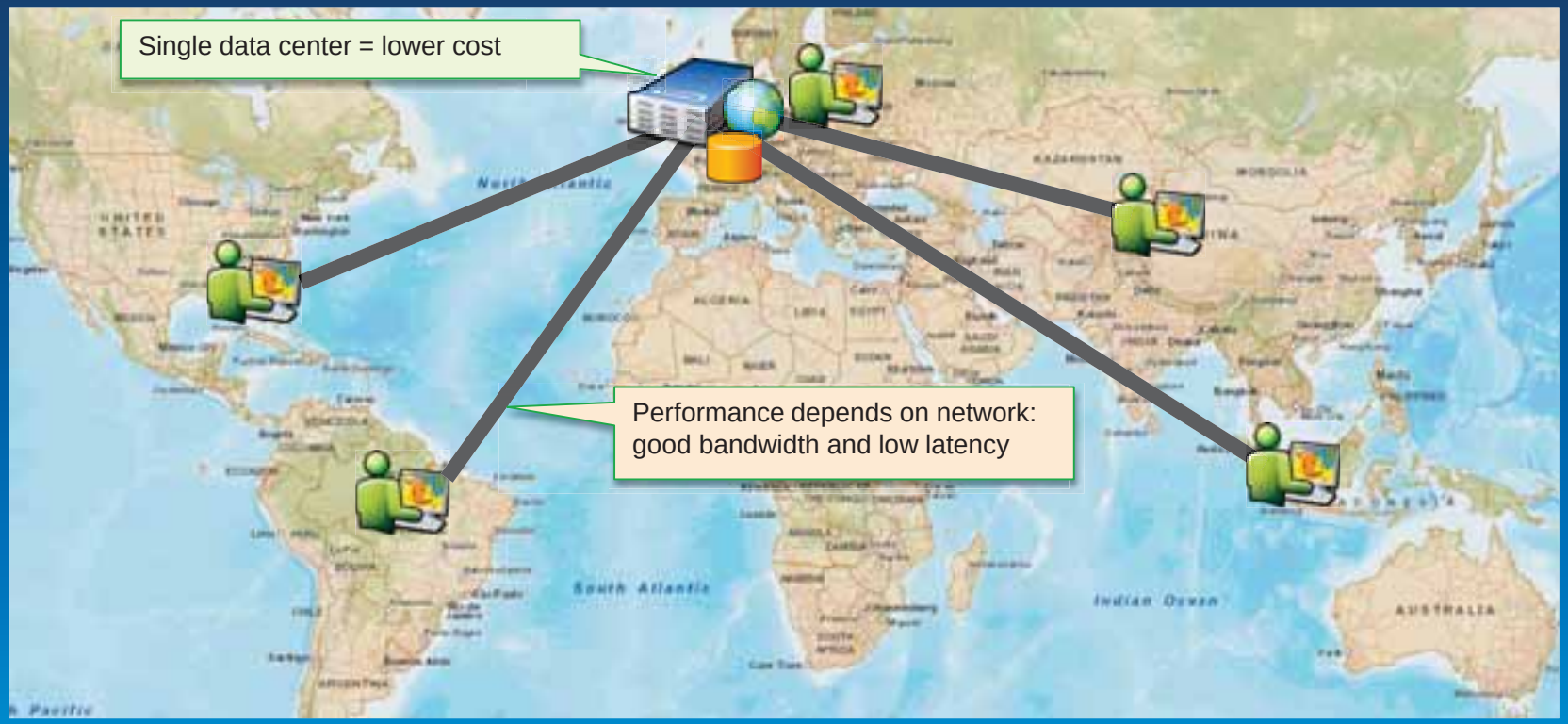
Phase D: Technology Architecture

- Physical infrastructure
- IT standards
- Hardware capacity
- Hardware redundancy



Architecture topology options

Centralized Architecture



Performance factors

Network transport time

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

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

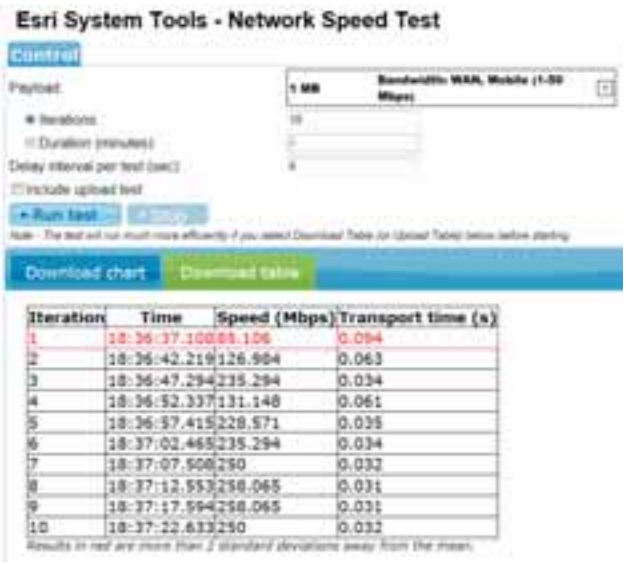
- Network transport time:
  - Response size (Mb)
  - Effective bandwidth

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

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

Demo

System Monitor –
Network Speed Test
(available on arcgis.com)



Iteration	Time	Speed (Mbps)	Transport time (s)
1	18:36:37.100	85.106	0.094
2	18:36:42.219	126.984	0.063
3	18:36:47.294	235.294	0.034
4	18:36:52.337	131.148	0.061
5	18:36:57.415	228.571	0.035
6	18:37:02.465	235.294	0.034
7	18:37:07.508	250	0.032
8	18:37:12.553	258.065	0.031
9	18:37:17.594	258.065	0.031
10	18:37:22.633	250	0.032

Results in red are more than 2 standard deviations away from the mean.

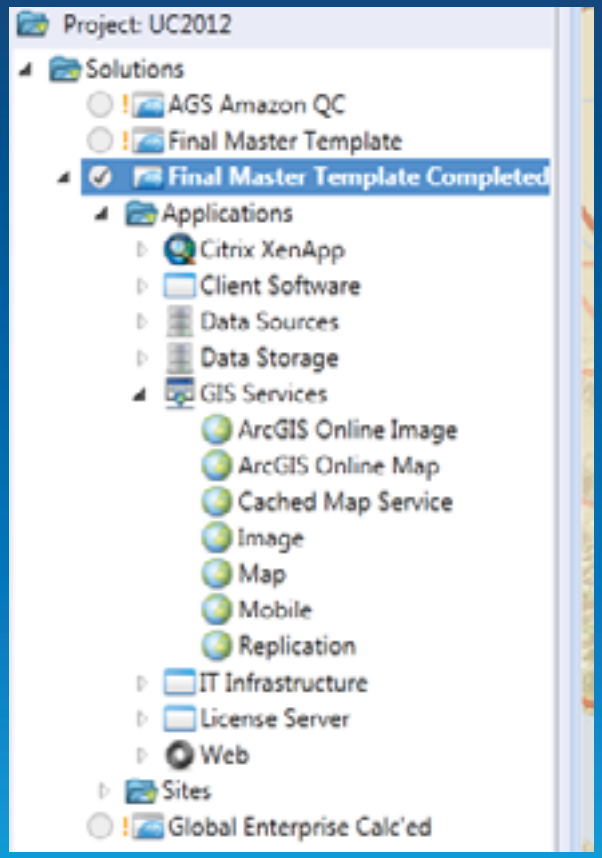
System Designer

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)

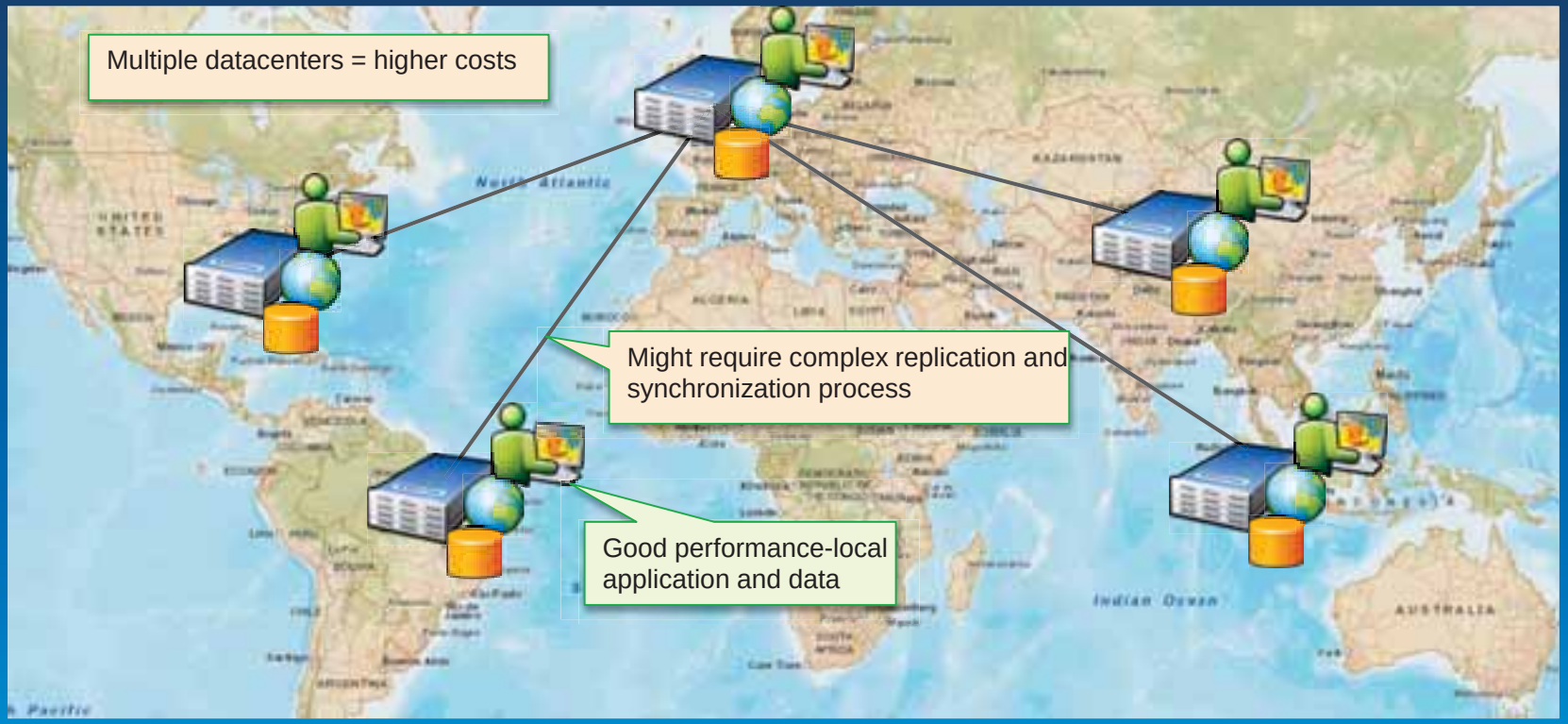
Performance Factors

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

					Network Traffic Transport Time (sec)					
					56 kbps	1.54 Mbps	10 Mbps	45 Mbps	100 Mbps	1 Gbps
Application Type	Service/Op	Content	Return Type	Mb/Tr	0.056	1.540	10.000	45.000	100.000	1000.000
ArcGIS Desktop	Map	Vector		10	178.571	6.494	1.000	0.222	0.100	0.010
Citrix/ArcGIS	Map	Vectror+Image	ICA Comp	1	17.857	0.649	0.100	0.022	0.010	0.001
Citrix/ArcGIS	Map	Vector	ICA Comp	0.3	5.357	0.195	0.030	0.007	0.003	0.000
ArcGIS Server	Map	Vector	PNG	1.5	26.786	0.974	0.150	0.033	0.015	0.002
ArcGIS Server	Image		JPG	0.3	5.357	0.195	0.030	0.007	0.003	0.000
ArcGIS Server	Map Cache	Vector	PNG	0.1	1.786	0.065	0.010	0.002	0.001	0.000
ArcGIS Server	Map Cache	Vector+Image	JPG	0.3	5.357	0.195	0.030	0.007	0.003	0.000

Distributed Architecture



Data replication considerations

Data replication considerations					
Requirements	**GDB Replication[1]**	**FGDB copy/paste**	**RDBMS Replication**	**RDBMS clone**	**Disk Block-level**
Geopgraphic area and selected layers	✓	✓			
Mixed DBMS	✓	✓			
Geodatabase aware	✓	✓	✓	✓	
Many to Many	✓		✓		
Incremental Edits	✓	✓	✓		✓
Large Truncate/Reload	✓[2]	✓	✓	✓	✓
Near Time	✓	✓	✓		
Downtime: 0	✓		✓		
Downtime: 5-60 min		✓		✓	✓

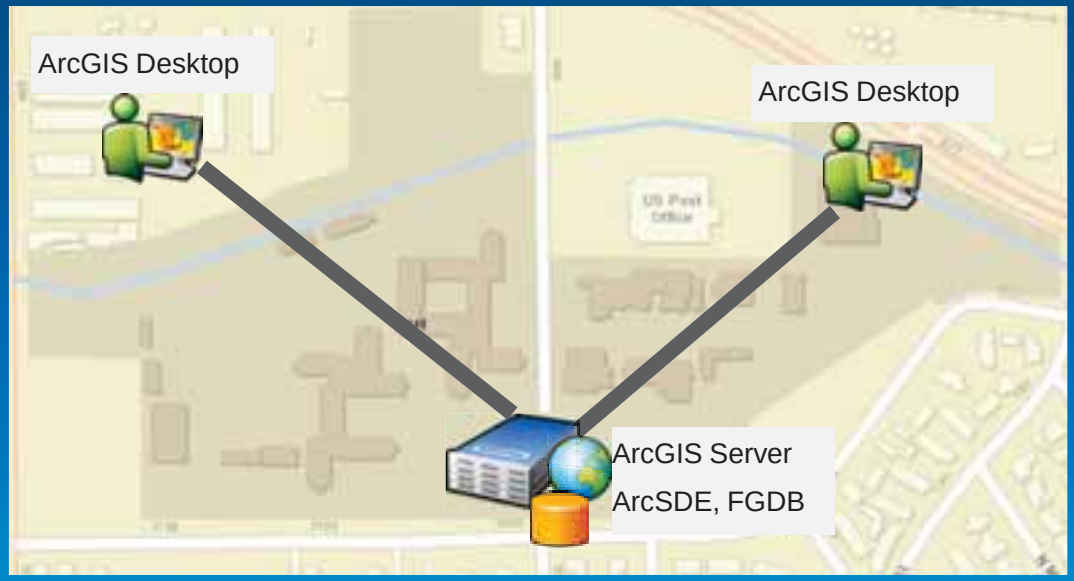
1- 3rd party product integrated through Esri API

2- Consider disconnected synchronization if network has high latency

Application deployment options

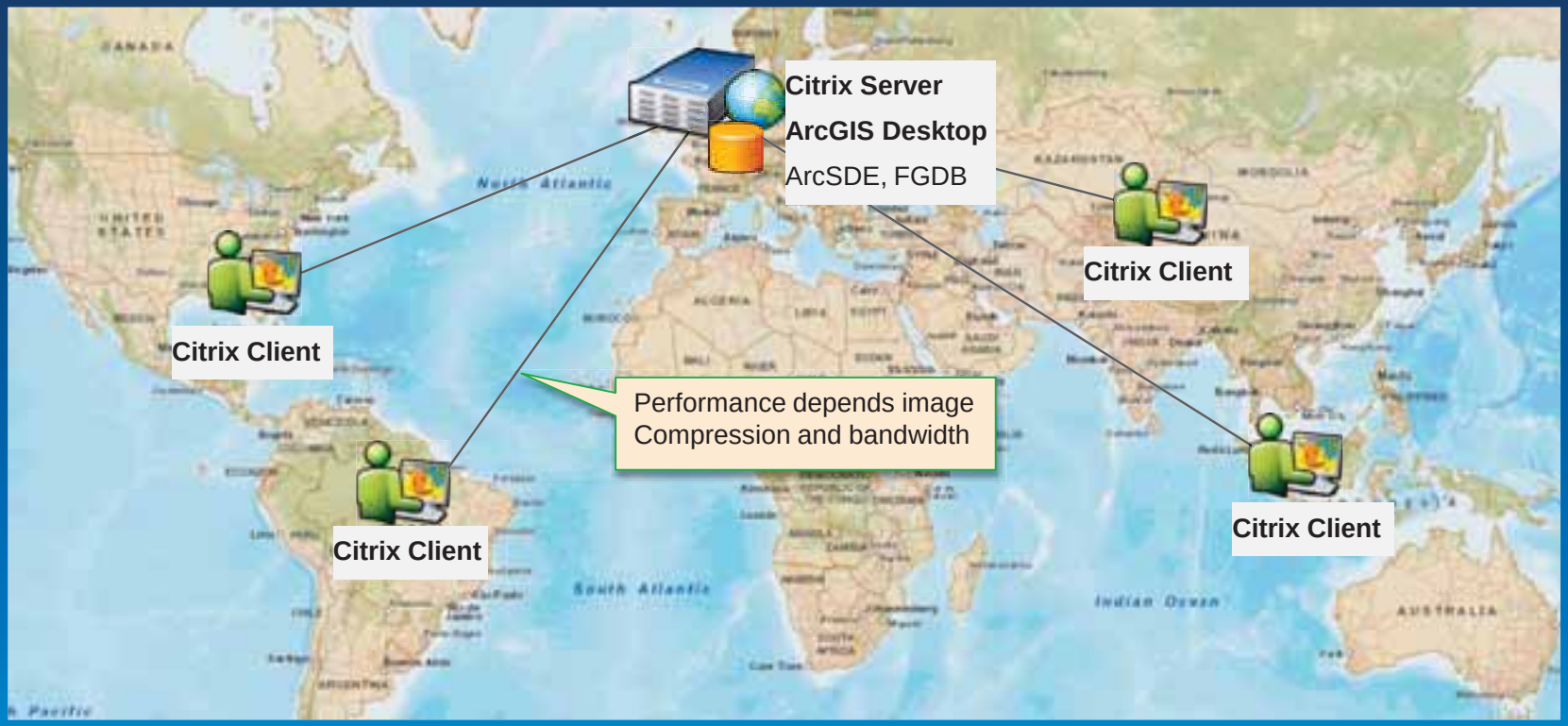
ArcGIS Desktop deployment options

LAN – standard deployment



ArcGIS Desktop deployment options

WAN – Citrix compression



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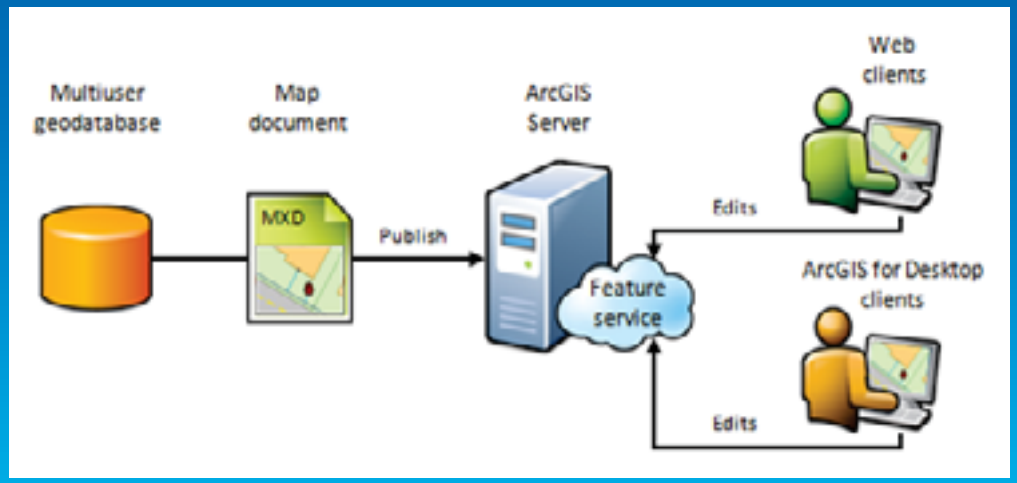
Smartphones and Tables

Feature Service

iOS

Microsoft Windows Phone

Android



COTS vs. custom

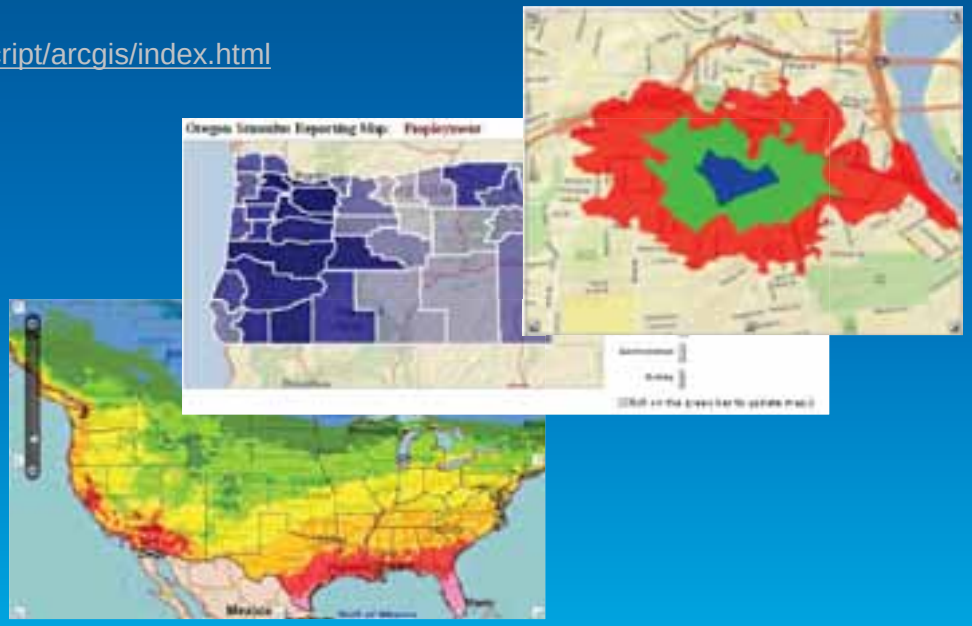
ArcGIS Online for Organizations

Operations Dashboard for ArcGIS

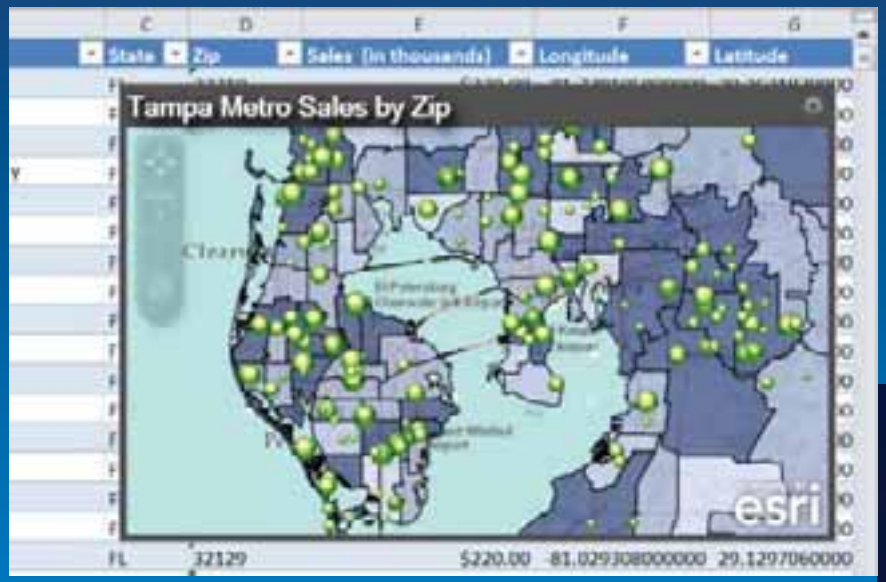
ArcGIS Server Web Applications

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
- http://help.arcgis.com/en/webapi/javascript/arcgis/index.html



Integration

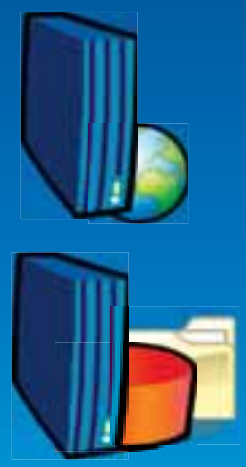


Esri Maps for Office

Esri Maps forSharePoint

Environments

System Environment Types



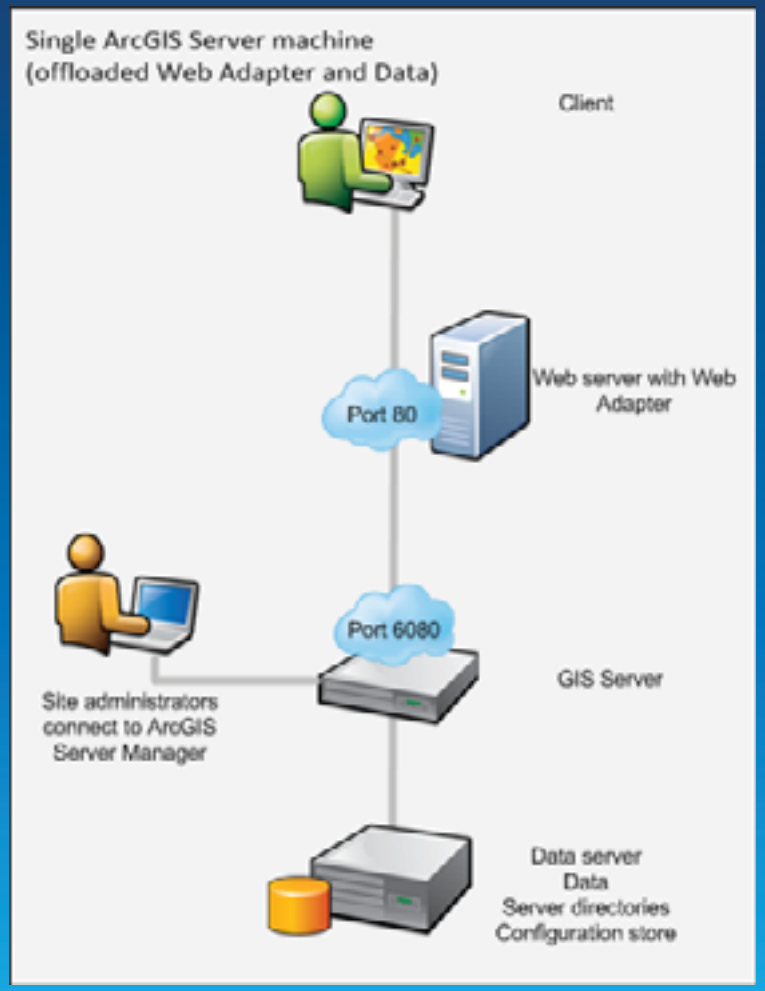
Development Systems

Reflect Production as closely as possible but without full scalability

Production Systems

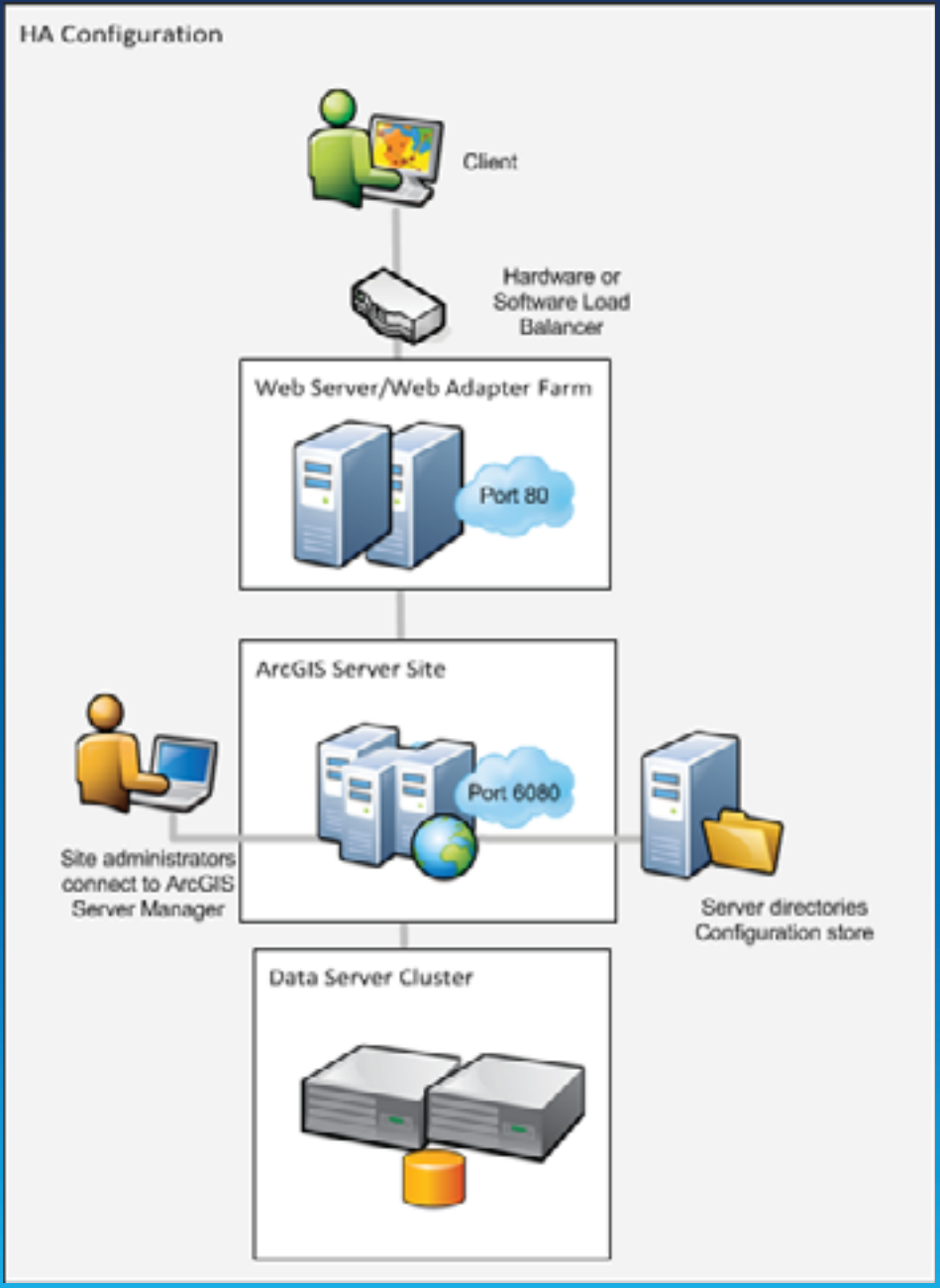
ArcGIS Server

Single ArcGIS Server machine



ArcGIS Server

High availability configuration

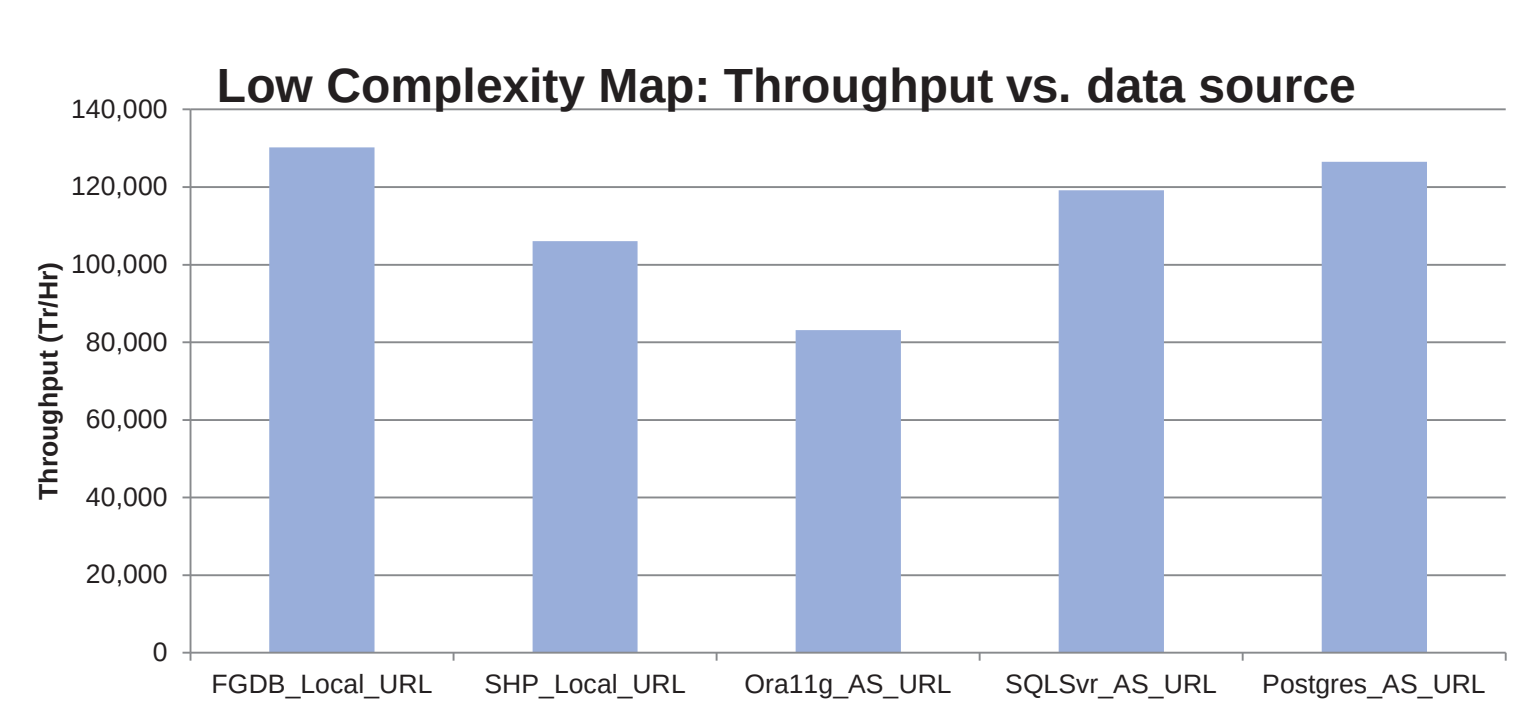


Geodatabase deployment options

Which database to select?

Follow your IT standards, expertise and cost

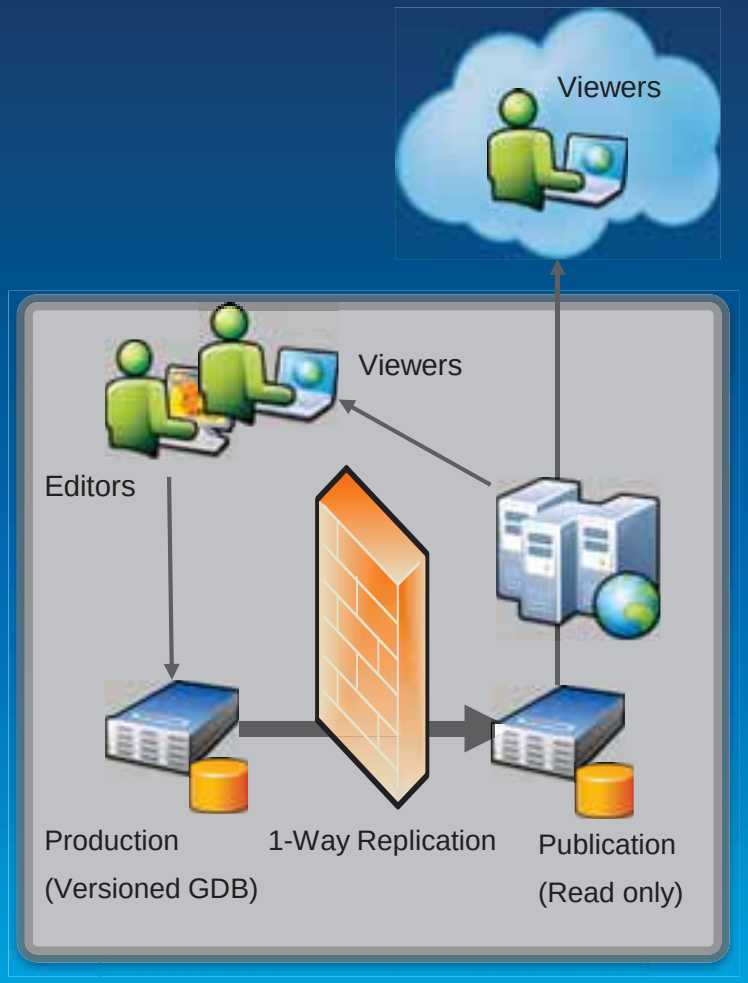
- DBMS impact on overall performance is typically low
  - < 20% of total response time



Geodatabase editing

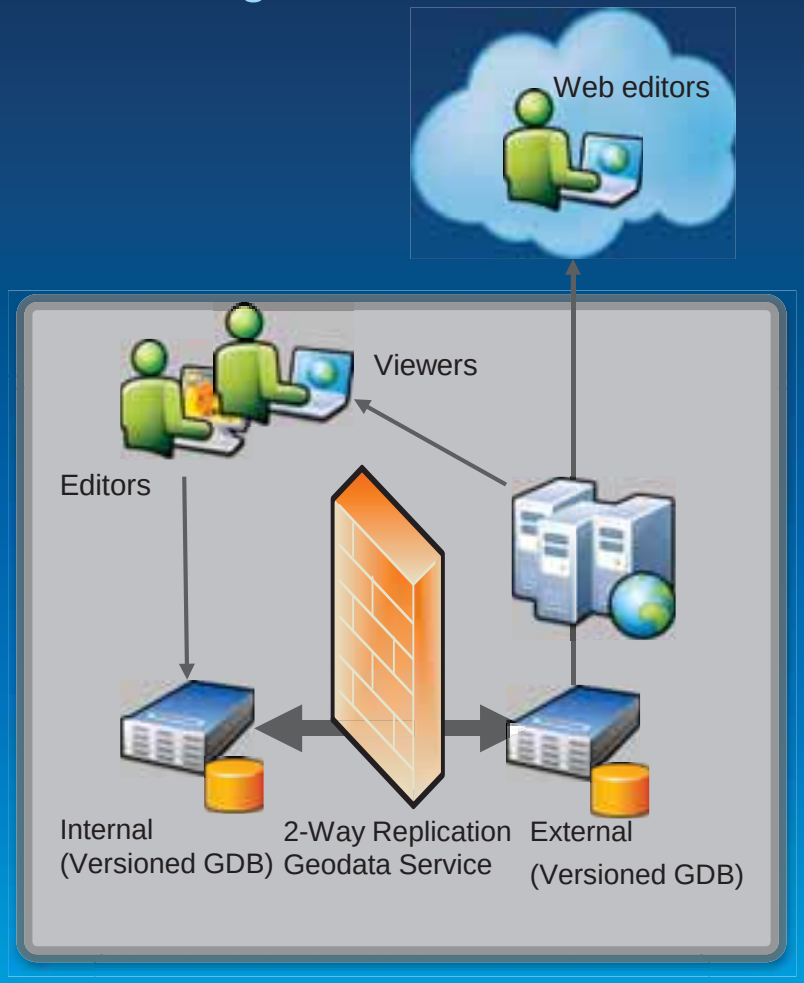
Production and Publication

- Pros:
  - Better security
  - Improved performance
  - Additional capacity
- Cons:
  - Requires replication
  - Additional hardware



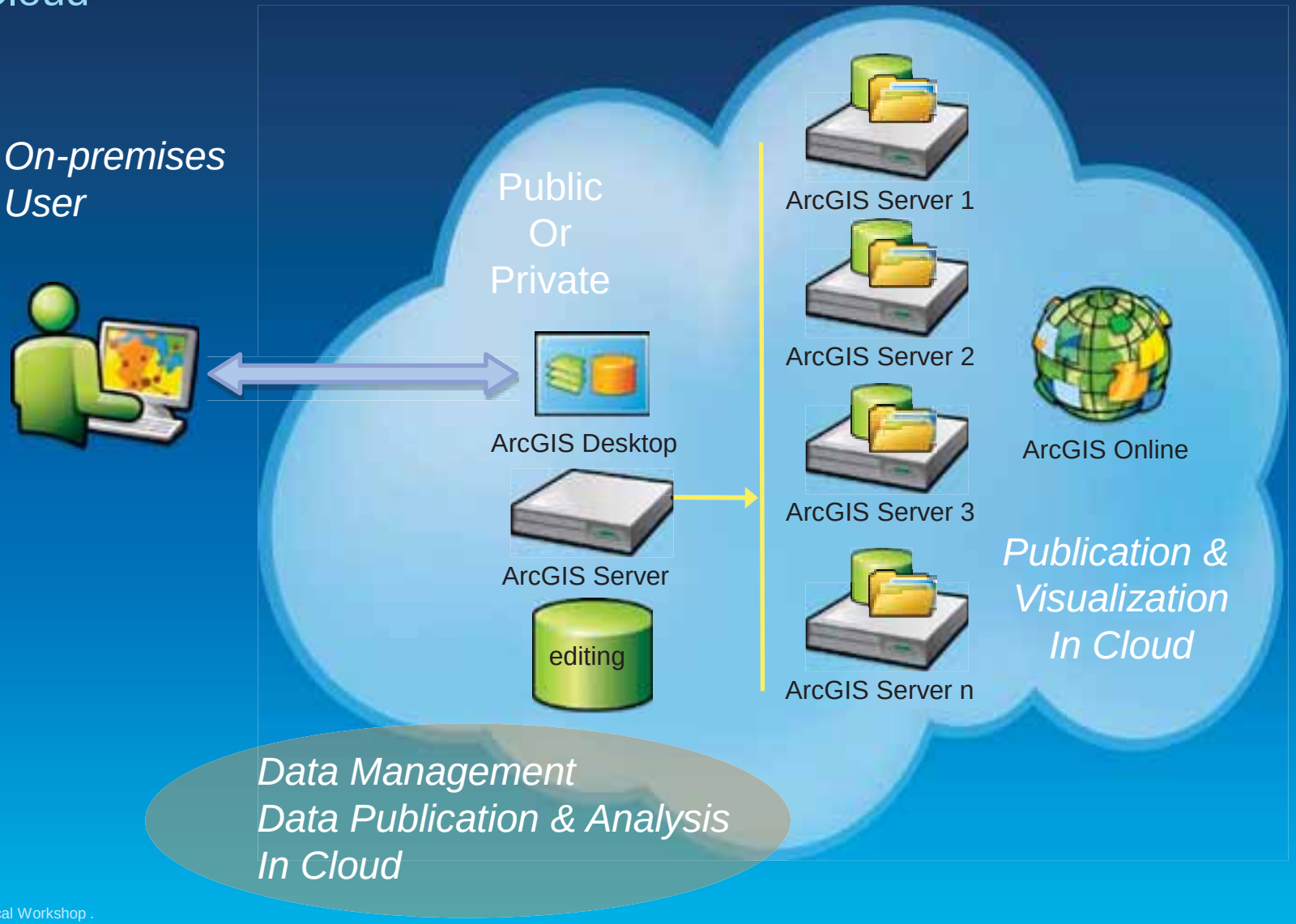
Geodatabase editing

Internal and external web editing



Data management strategy

In Cloud

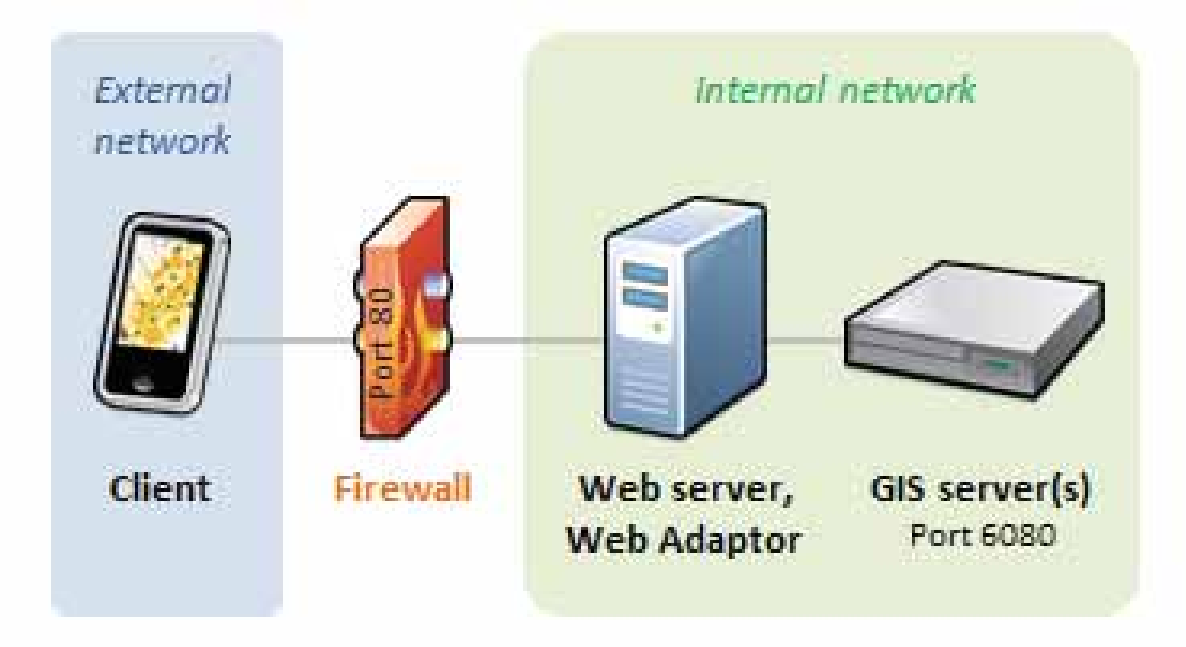


Security

ArcGIS Server 10.1

Single firewall

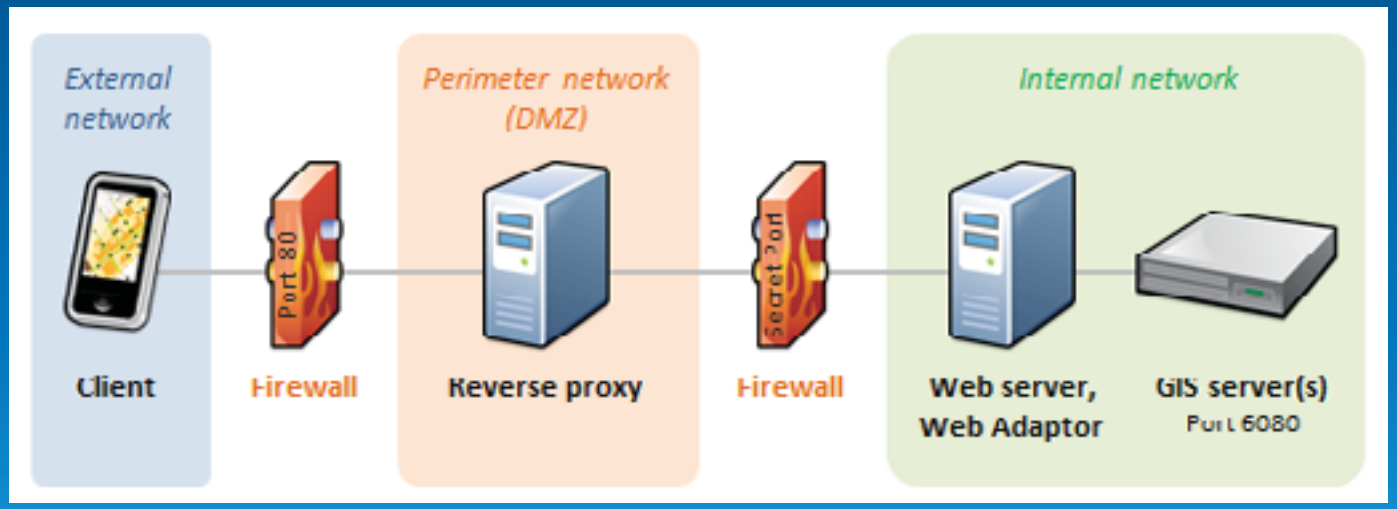
- Port 80 opened
- GIS and data server reside in the secure internal network



ArcGIS Server 10.1

Integrating an existing proxy

- To select your port, install the Web Adaptor on another web server

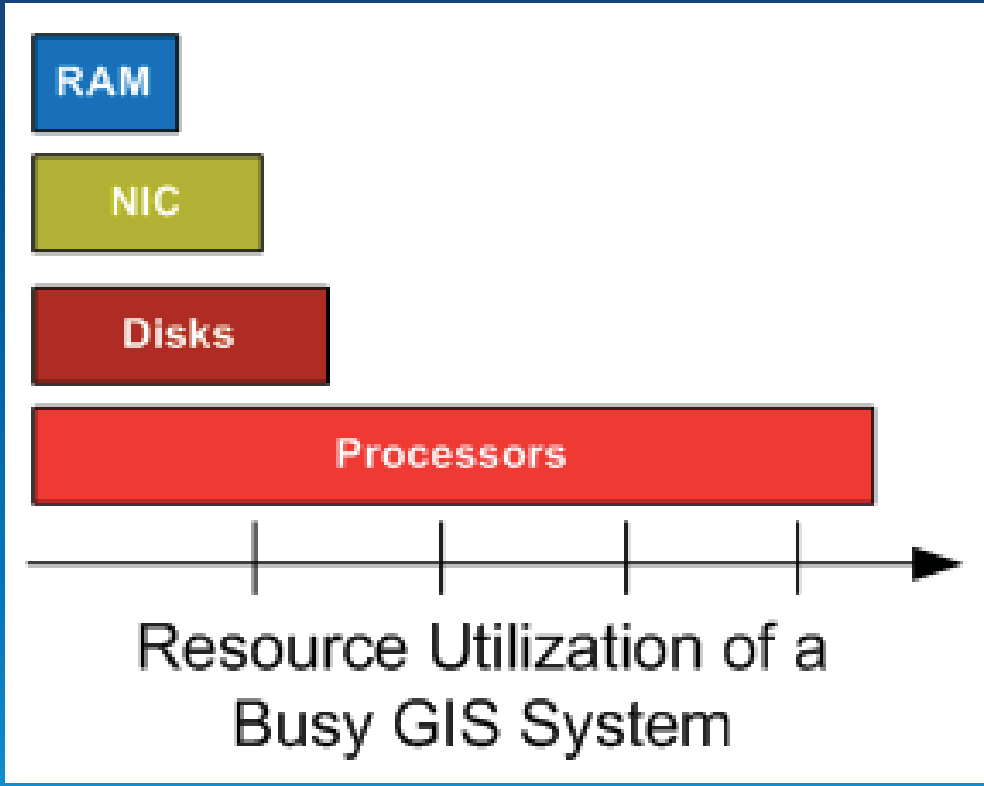


Hardware for Enterprise GIS

Selecting right hardware

Most Enterprise GIS solutions are CPU bound

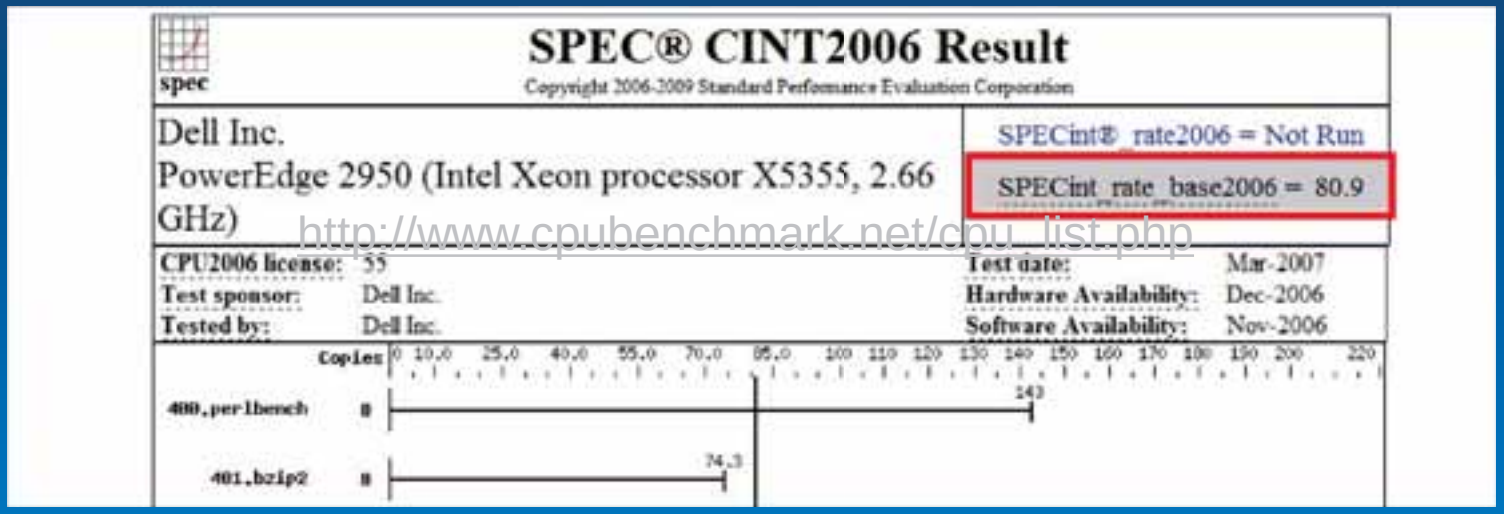
- CPU
- Network bandwidth
  - and latency
- Memory
- Disk



Most well-configured and tuned GIS systems are processor bound.

Hardware benchmarks

CPU Processor Speed – Specrate.org



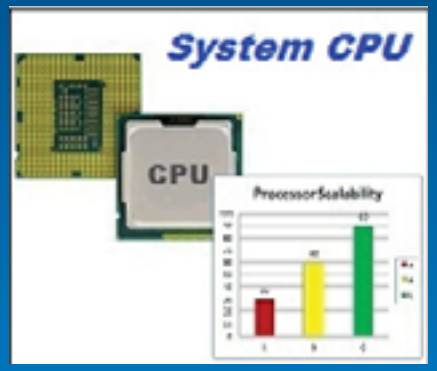
Hardware virtualization

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

Overburdened VMs will incur significant performance degradation

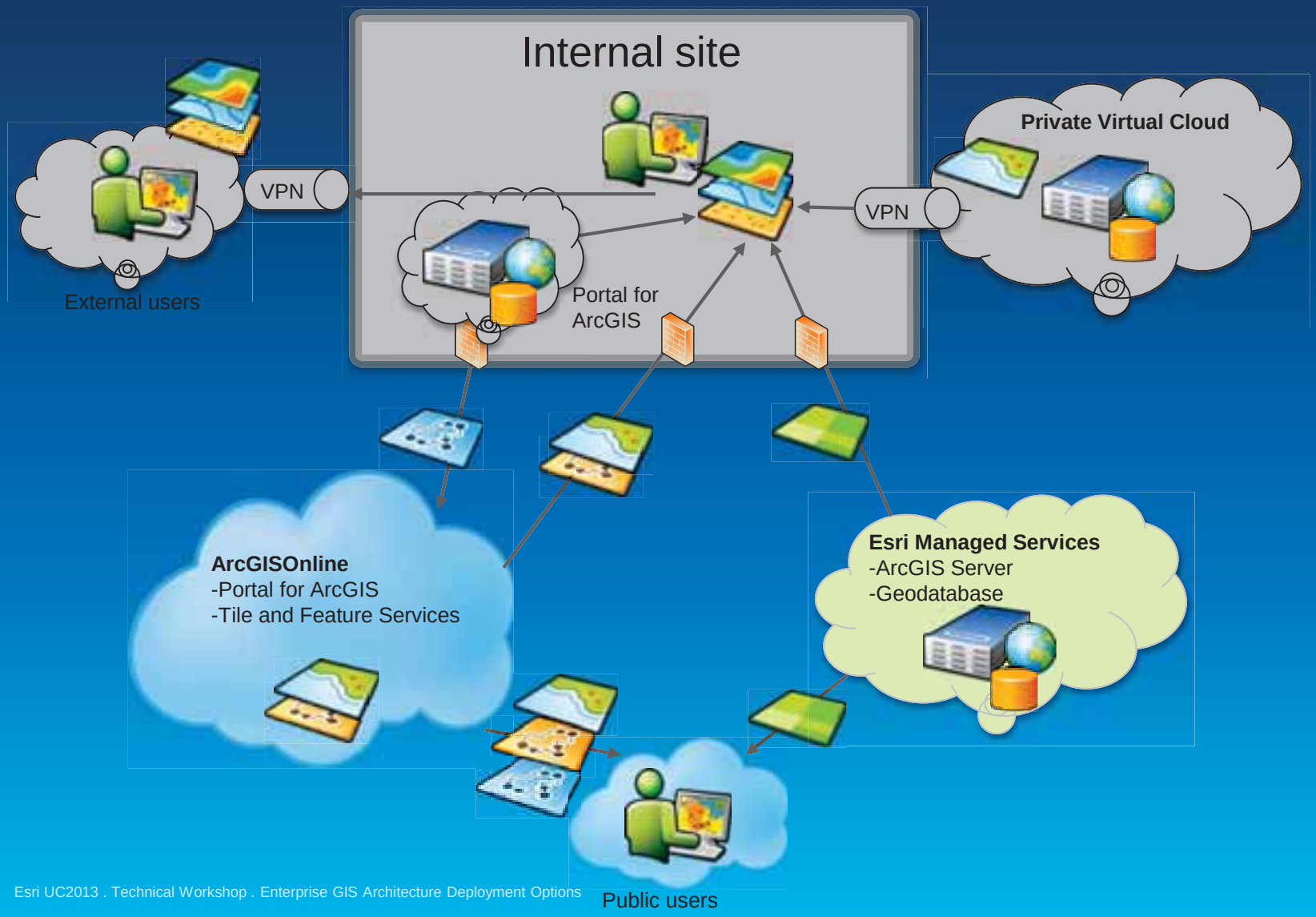
Demo

System CPU



Cloud options

Cloud deployment options



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

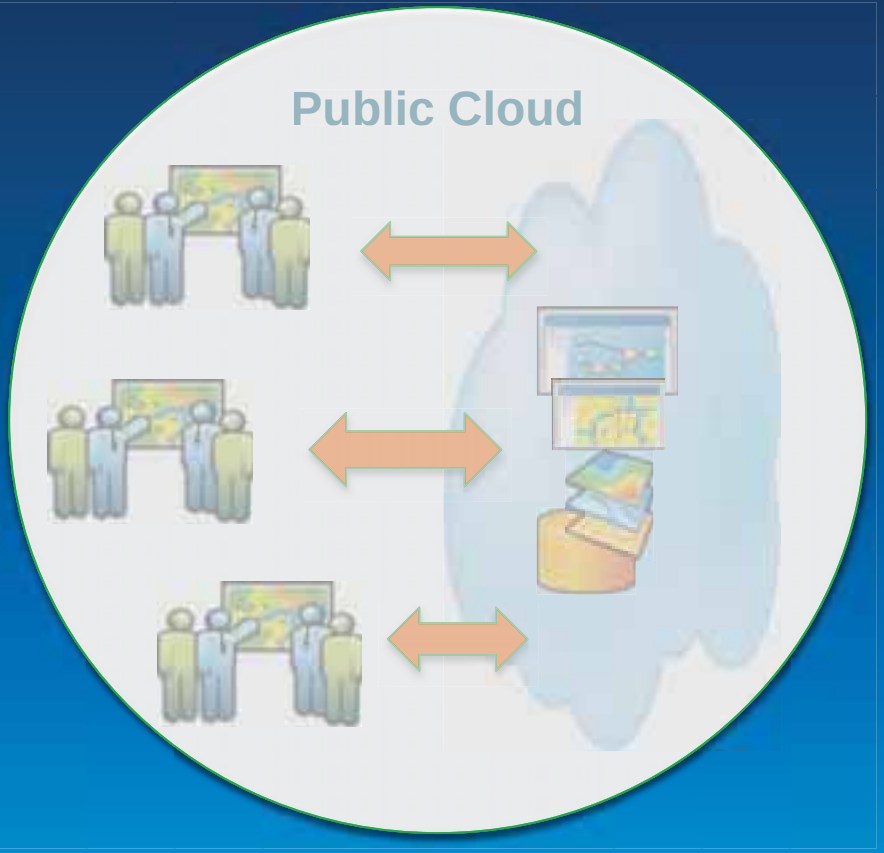
Self Service ← → **Full Service**

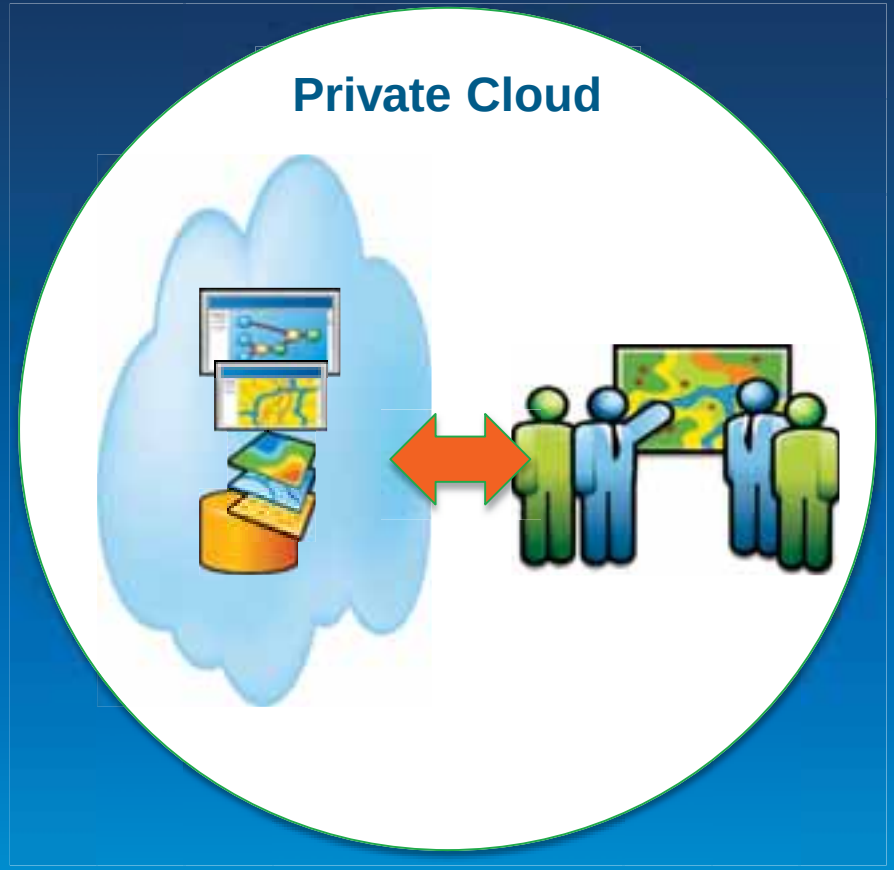
Deployment Patterns

Sandbox	Production
Surge Support	AGOL Hybrid
Disaster Recovery	Private Cloud

Flexible offerings to support a variety of needs

Leveraging the Cloud – Security & Control



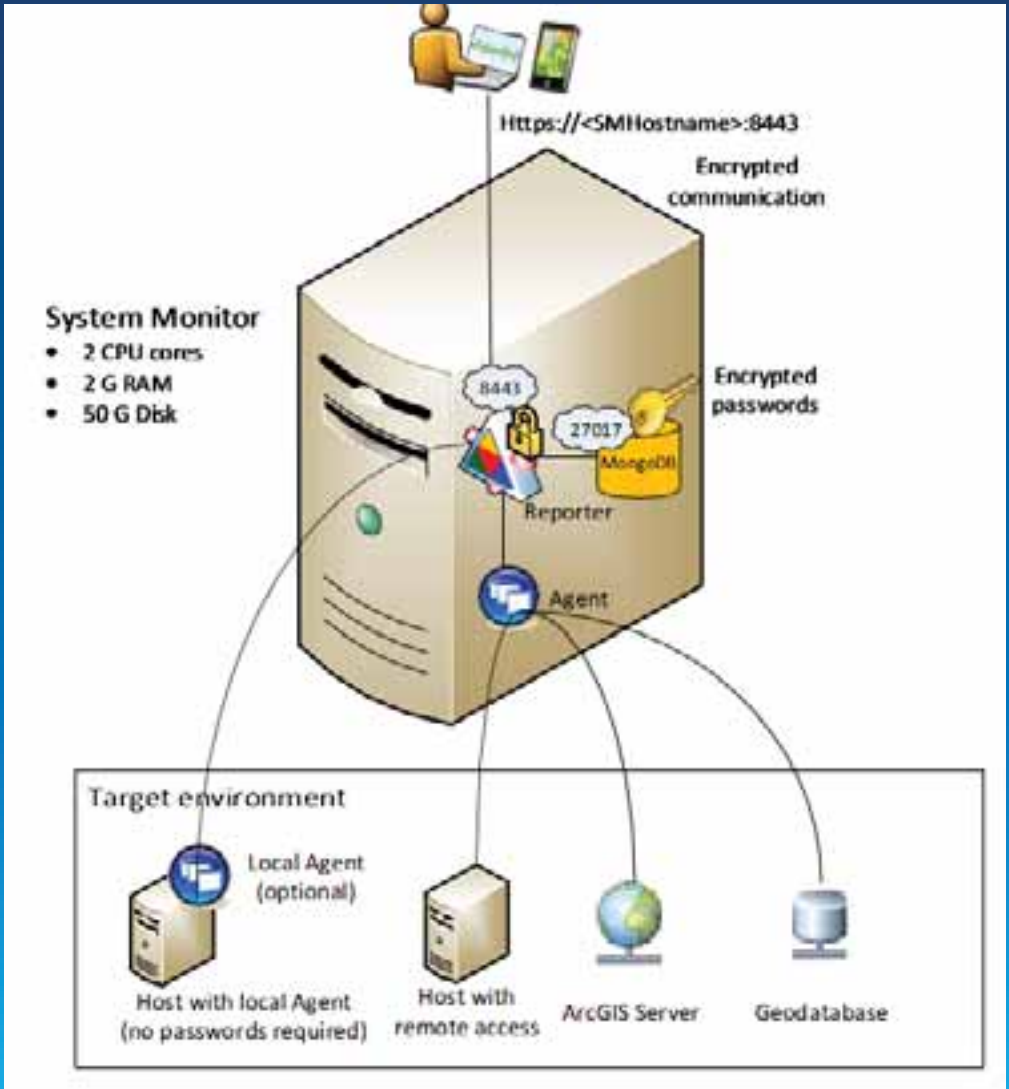


LESS ← → MORE

Security & Control

Enterprise GIS Monitoring options

System Monitor



Demo

System Monitor – Enterprise GIS monitoring tool

Tools

- System Designer
- http://www.arcgis.com/home/item.html?id=8ff490eef2794f428bde25b561226bda.
- 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

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Paper – pick up and put in drop box