

# **ArcGIS Server Administration, Configuration, Tuning, and Optimization**

**Michele Lundeen-ESRI**

# Topical Outline

- **Preparing GIS documents**
- **Publishing GIS services**
- **Creating and Configuring GIS applications**
- **Administration & System Monitoring**
- **Deployment Architectures**

# Preparing GIS Documents

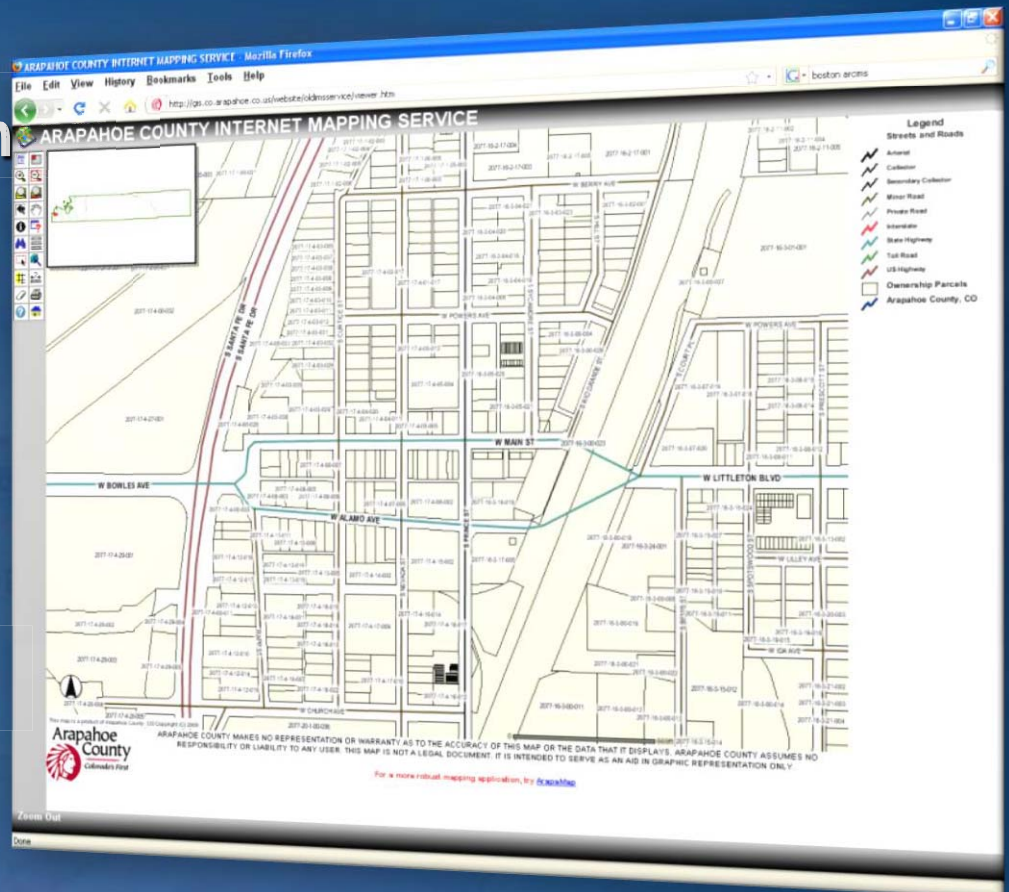
## *General Overview*

- Understand application requirements
- Design specifically for server deployment
  - Maps
    - “Web 2.0”
    - Cached – *“basemap” data*
    - Dynamic – *“operational” data*
  - Geoprocessing Models
    - Preprocessing
    - Limit inputs
  - Mobile Applications
    - Devices
    - Environment
  - Geocoding
    - Locator locations

# Web Maps 1.0

## Common pitfalls

- Too many data layers
- Toggling every layer on
- Poor cartography
- No scale dependency
- Slow dynamic drawing



- School Quality
- Local Streets
- Major Roads
- States
- MSA
- Counties
- City/Town/Village/CDP
- School Districts
- Zip Code Area

- PLSS Sections - Grant
- PLSS Townships - Grant
- Supervisory District Labels - Iowa
- Supervisory Districts - Iowa
- Supervisory Districts - Lafayette
- School Districts - Iowa
- School Districts - Lafayette
- PLSS Labels - Iowa
- PLSS Corners - Iowa
- PLSS Govt Lot Lines - Iowa
- PLSS Quarter Quarter Sections - Iowa
- PLSS Quarter Sections - Iowa
- PLSS Sections - Iowa
- PLSS Townships - Iowa
- PLSS Sections - Lafayette
- County Roads - Grant
- County Roads - Iowa
- County Roads - Lafayette
- Water Labels - Grant
- Water Bodies - Grant
- Water Bodies - Iowa
- Water Bodies - Lafayette
- Parcel Tax Key Number - Grant
- Parcel Tax Key Number - Iowa
- Parcel Dimensions - Grant

- 10-Foot Elevation Contours
- 2-Foot Contours - North
- 2-Foot Contours - South
- Municipality
- Lake
- Navigable Stream
- Navigable Pond
- Soil Label
- Soils Sheet
- Watershed
- Plat/Condo
- Michigan (Upper Peninsula)
- Green Bay / Lake Michigan
- Airports/Airstrips
- Park

- Police Departments
- Airports
- County Government
- EMS
- Fire Departments
- Haz\_Mat
- Schools
- Churches
- Waysides
- Hospital
- ESN
- School Districts
- Parcel Features**
- Lot Dimensions \*
- Parcels \*
- Subdivisions \*
- Easements \*
- Recreation**
- ATV Trails
- Campgrounds
- Parks
- Boat Landings
- Snowmobile
- Environmental Features**
- Soils
- Dams
- Floodplain

# Web Maps 2.0

*Change your approach*

- Only include layers that support the business need
- Logical grouping of layers
- Small number of layers to turn on and off
- Choose the best option for publishing the map
  - Cached tiles
  - Dynamic layers
  - Client-side graphics

# Organize data into logical groupings

## Basemaps

Geographic frame of reference

Contain static vector and raster data

Reusable in multiple applications

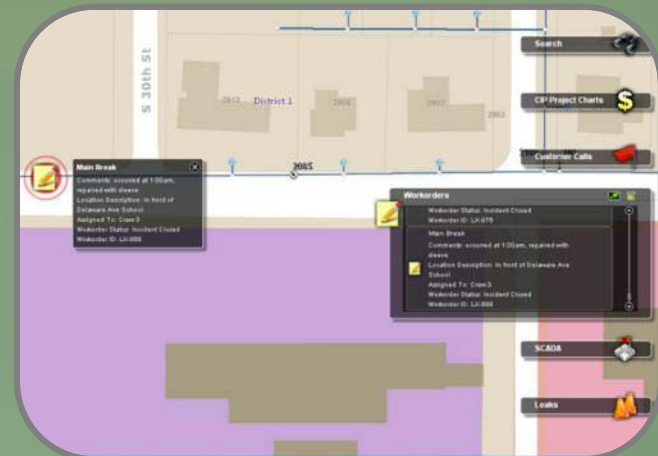


## Operational Layers

Show a focused item of interest

Support functionality of the application

Displayed on top of base map



# Some ArcGIS Server examples

- Orange County Property Appraiser Map



- Solar Boston



- City of Greeley Property Information Map





# Case study: Google Maps

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**Google**<sup>™</sup>   [Show search options](#)

Find businesses, addresses and places of interest. [Learn more.](#)

» Print Send Link

Traffic More... **Map** Satellite Terrain

500 mi  
500 km

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# Google Maps base maps

## “Map”

- Highways
- Streets
- Ferries
- Railroads
- Transit centers
- Cities
- Parks
- Military reservations
- Municipal boundaries
- Lakes
- Rivers
- Golf courses
- Hospitals
- Shopping centers
- Airports
- Colleges
- Cemeteries
- Amusement parks

## “Terrain”

- Shaded relief
- Vegetation
- Highways
- Streets
- Cities
- Parks
- Military reservations
- Municipal boundaries
- Lakes
- Rivers
- Golf courses
- Hospitals
- Shopping centers
- Airports
- Colleges
- Cemeteries
- Amusement parks

## “Satellite”

- Imagery

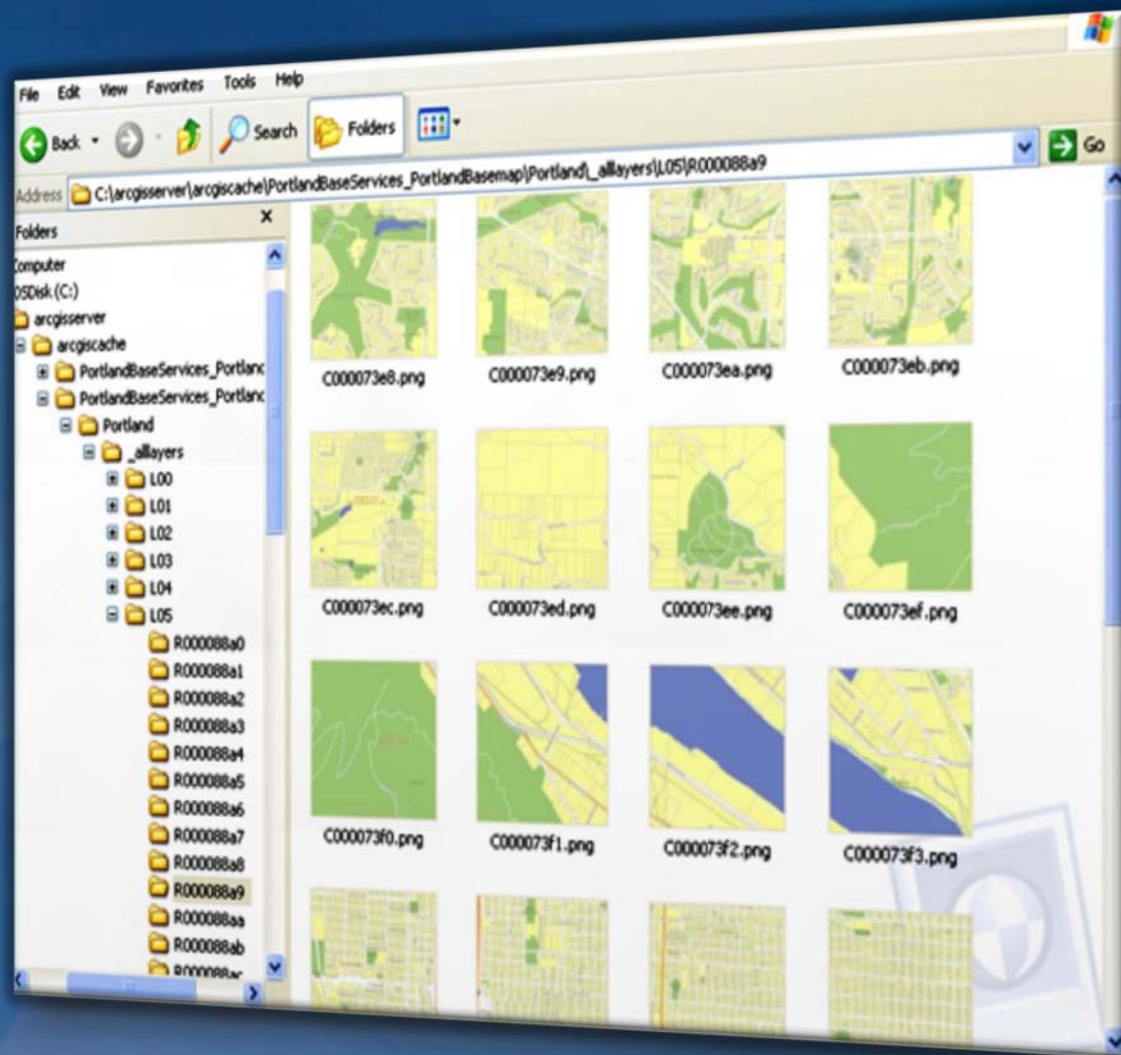
# Preparing GIS Documents

## *General Overview*

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    - Devices
    - Environment
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    - Locator locations

# Benefits of Map Cache

- Best performance
- Improved scalability
- More options for cartography



# Working with Map Cache

## Best Practices

- Chose appropriate image output type
  - Raster cache use JPEG
  - Vector cache use PNG
- Match scale dependency levels with cache levels
- Same projection for all services
  - Coordinate if you plan to share cache or do mash-ups
  - Avoid projection on the fly
- Create a test cache using a small area

# Resources for Building Map Cache

- **SERUG session**

- Designing, Deploying, and Using Cached Map Services Wed 8:30am

- **Virtual Campus Seminar**

- *Implementing and Optimizing ArcGIS Server Map Caches*

- **ArcGIS Documentation: Caching Services Topic**

- **ArcGIS Server Blog, Map Cache Tag**

<http://blogs.esri.com/Dev/blogs/arcgisserver/>

# Preparing GIS Documents

## *Dynamic Map Services: Feature Rendering*

- **Points**

- Use single layer Simple or Character markers for best performance
- Use EMF instead of bitmaps
- Use Integer (vs. character) fields for symbol values
- Avoid halos (MSD review), complex shapes, masking

- **Line & Polygons**

- *Use ESRI\_Optimized style (for MXD Service only)*
- Avoid cartographic lines (also includes polygon outline!)

# Preparing GIS Documents

## *Dynamic Map Services: Feature Rendering*

- Avoid Projecting on the fly
- Avoid cross db joins
- Avoid wavelet compression-based raster types (MrSid,JPEG2000)
- Avoid service within a service



# Preparing GIS Documents

## *Dynamic Map Services: Text and Labeling*

- **Avoid Maplex for dynamic labeling**
- **Use annotation instead of labels when possible**
- **Avoid special effects (fill patterns, halos, callouts, backgrounds)**
- **Avoid very large text size (60+ pts)**
- **Avoid Highway symbols**
- **Use indexed fields (reduce label SQL query number and complexity when possible)**
- **Use label and feature conflict weights sparingly**
- **Avoid overuse**

# Performance Factors: ArcGIS Server Services

## Demo: Optimizing mxd with MXDPerfStat (ArcScripts)

Item	At Scale	Layer Name	Refresh Time (sec)	Recommendations	Features	Vertices	Labeling	Geography Phase (sec)	Graphics Phase (sec)	Cursor Phase (sec)	DBMS CPU	DBMS LIO
18	8,000	Tax Lots	1.05	Simplify labeling, symbology: GraphicsPhase=.83;	2,226	33,872	True	.14	.83	.20	.08	6,396
19	8,000	Tax Lots Query Def	.13		1	26	False	.03	.02	.06	.03	3,204
20	8,000	TaxlotDenseLabel	1.84	Simplify labeling, symbology: GraphicsPhase=1.03; simplify geometry and/or set label scale; convert polygon to polyline: vertices fetched=200001; simplify geometry and/or set label scale: vertices fetched=200001;	1	200,001	True	.73	1.03	.95	.01	266
21	8,000	TaxlotDenseNoLabel	.53	simplify geometry: vertices fetched=200001;	1	200,001	False	.47	.02	.97	.00	140

# Optimized Map Services

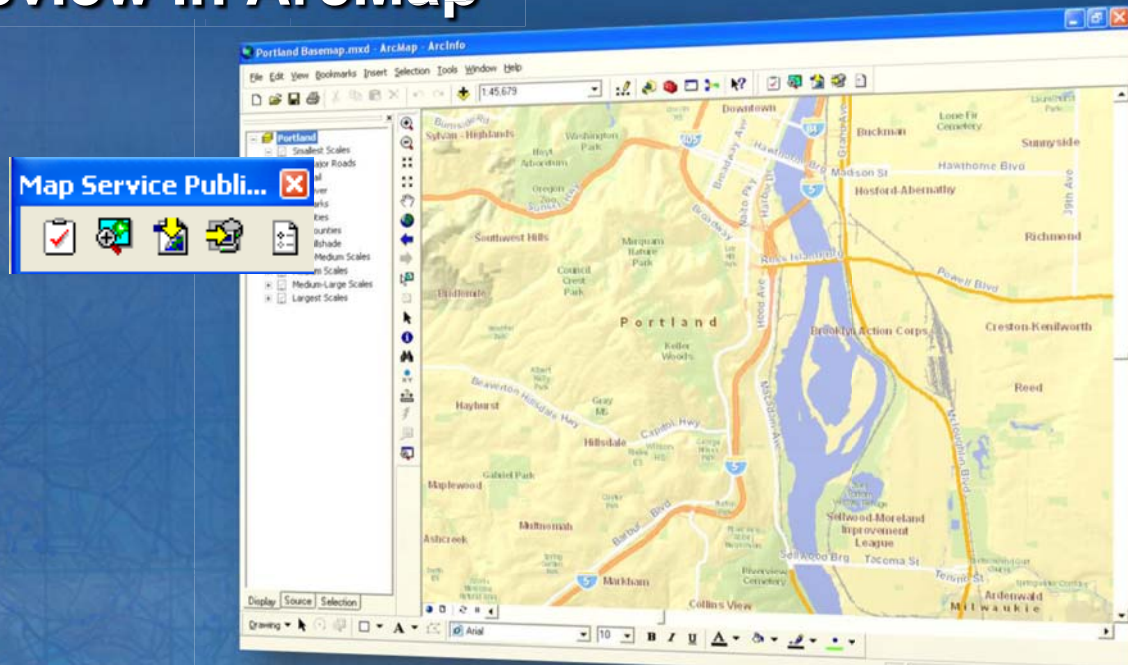
*New at 9.3.1*

- **New high performance drawing engine**
  - **Completely re-designed**
  - **Focused on symbology and cartography**
- **Provides best performance for dynamic maps**
- **Build cache faster**
- **Creates a service definition file (MSD)**

# Map Service Publishing Toolbar

*New at 9.3.1*

- Identify layers or issues that may degrade performance
- Available in ArcView, ArcEditor and ArcInfo
- Analyze and preview in ArcMap



# Analyze the map

*Improve performance*

- Discover content affecting performance
- Review results: Errors, Warning and Messages
- Preset solutions available in the analysis tool

**Prepare**

2 Errors 26 Warnings 0 Messages Search:

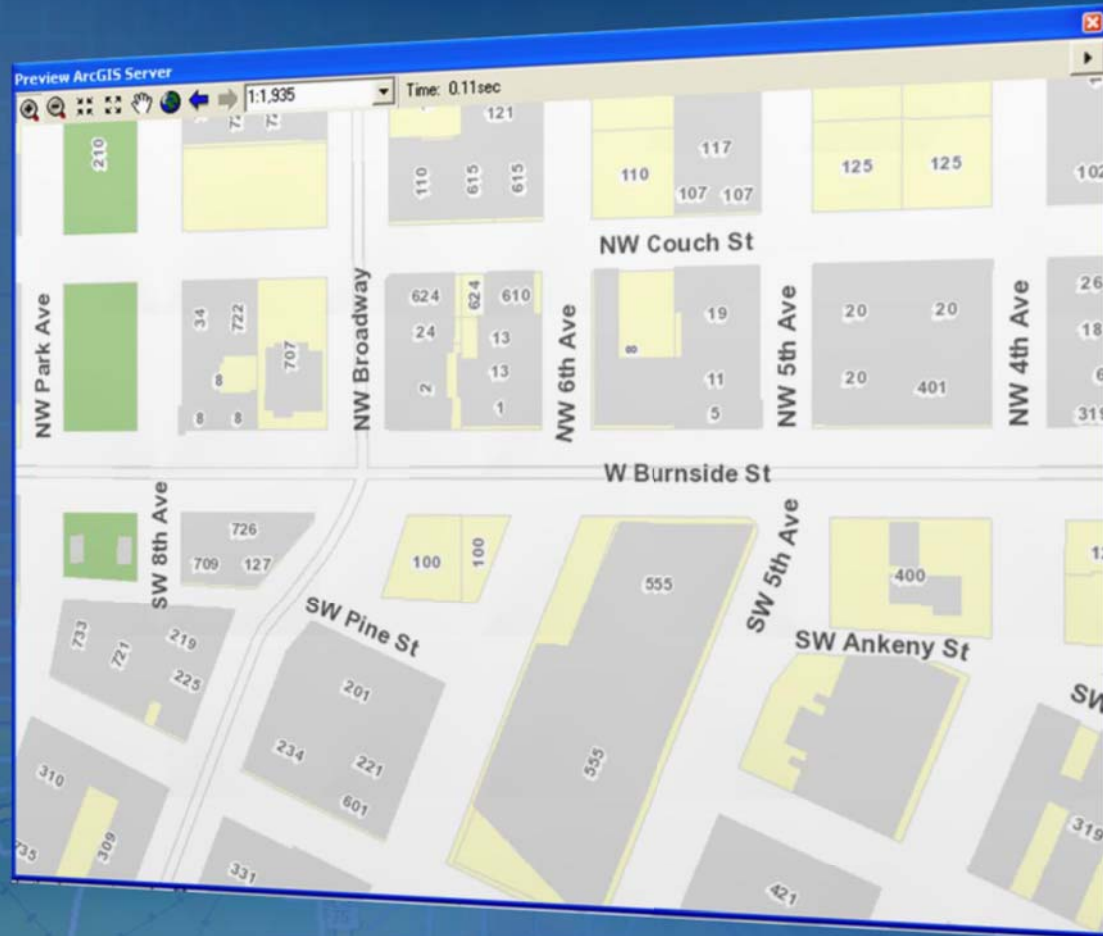
	Severity	Status	Code	Description	Name	Type	Data Frame
✖	High	Unresolved	00008	Maplex Label Engine is not supported	Portland	Data Frame	Portland
✖	High	Unresolved	00006	Layer's symbology is not supported	Buildings	Layer	Portland
⚠	High	Unresolved	10001	Layer's data source has a different projection [NAD_198...	Hillshade	Layer	Portland
⚠	High	Unresolved	10001	Layer's data source has a different projection [NAD_198...	Hillshade	Layer	Portland
⚠	High	Unresolved	10001	Layer's data source has a different projection [NAD_198...	Buildings	Layer	Portland
⚠	Medium	Unresolved	10033	Layer uses symbol level drawing with layer transparency	Major Roads	Layer	Portland
⚠	Medium	Unresolved	10033	Layer uses symbol level drawing with layer transparency	Major Roads	Layer	Portland
⚠	Medium	Unresolved	10009	Enabling the option to convert layer transparency to colo...	Parks	Layer	Portland

Status: Complete 28/28 Items Show only unresolved items

# Preview the map

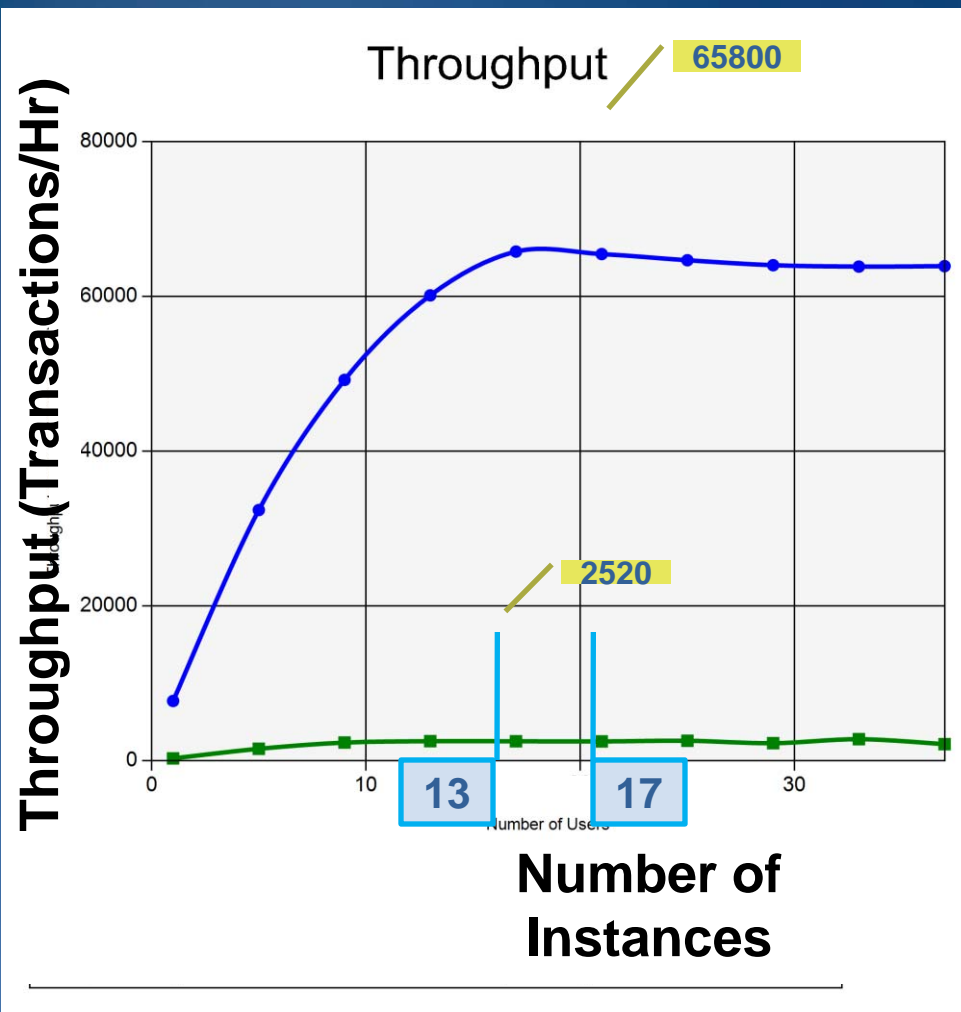
*Improve performance*

- Assess drawing performance and graphic quality before publishing



# Performance Factors: ArcGIS Server Services (MapService)

## Uncorrected vs. Corrected Source ArcMap Document



**Corrected**  
(Unloaded TT: 0.34 sec)  
(2.1 Instances/core)

**Uncorrected**  
(Unloaded TT: 11.97 sec)  
(1.6 Instances/core)

# Preparing GIS Documents

## *Map Services Conclusion*

- **Caching always gives best performance**
- **Use optimized map services for operational layers**
- **Use standard map services for layers that cannot be optimized**



# Preparing GIS Documents

## *Geoprocessing Services*

- **Use Local Jobs Directory**
  - **Greatest single performance factor.**
  - **9.3.1 allows simple deployment**
- **Subset very large rasters**
- **Use native types like GRID**
- **Use Layers instead of raw data from db**
- **Use in-memory feature data sets**

# Preparing GIS Documents

## *Geoprocessing Services*

- Pre-compute intermediate steps when possible
- Use local paths to data and resources
- Avoid unneeded coordinate transformations
- Add attribute indexes
- Simplify data

**Desktop Help:**

**Performance tips for geoprocessing services**

# Preparing GIS Documents

## *Mobile Services*

- **Document Preparation**
  - Minimize operational layers
  - Cache basemap layers
- **Service Configuration**
  - Try to keep total service cache size under 250 MB to avoid network swapping.
  - Upload/Download size limits (200K upload/4MB download)  
[http://www.banmanpro.com/support2/File\\_Upload\\_limits.asp](http://www.banmanpro.com/support2/File_Upload_limits.asp)
- **Usage considerations**
  - Avoid batch postings in favor of frequent updates

# Preparing GIS Documents

## *Geocoding Services*

- **Single address geocoding**
  - ArcSDE address locators for single address geocoding
- **Batch address geocoding**
  - File-based address locators for batch geocoding
    - Use local locator files instead of UNC
- **All geocoding**
  - Take locator defaults

# Preparing GIS Documents

## *Geodata Services*

- **Data Preparation**

- Perform regular version maintenance (keep versioning tree small, compress, schedule synchronizations, etc)

- <http://blogs.esri.com/Dev/blogs/geodatabase/archive/2008/11/25/Geodatabase-replication-and-compress.aspx>

- Use 1 way replicas over 2 way replicas when possible

- Consider 2 way replicas instead of check-out replicas

- Well-defined data model

# Topical Outline

- Preparing GIS documents
- **Publishing GIS services**
- Creating and Configuring GIS applications
- Administration & System Monitoring
- Deployment Architectures

# Publishing GIS Services

- **Response Time Factors**
- **Object Pooling and Instances**
- **Process Isolation**
- **Mapping**
  - Caching
  - Output Image Types
- **Mobile Caches**
- **Geoprocessing**
- **Geocoding**

# Publishing GIS Services

## *Response Time Factors*

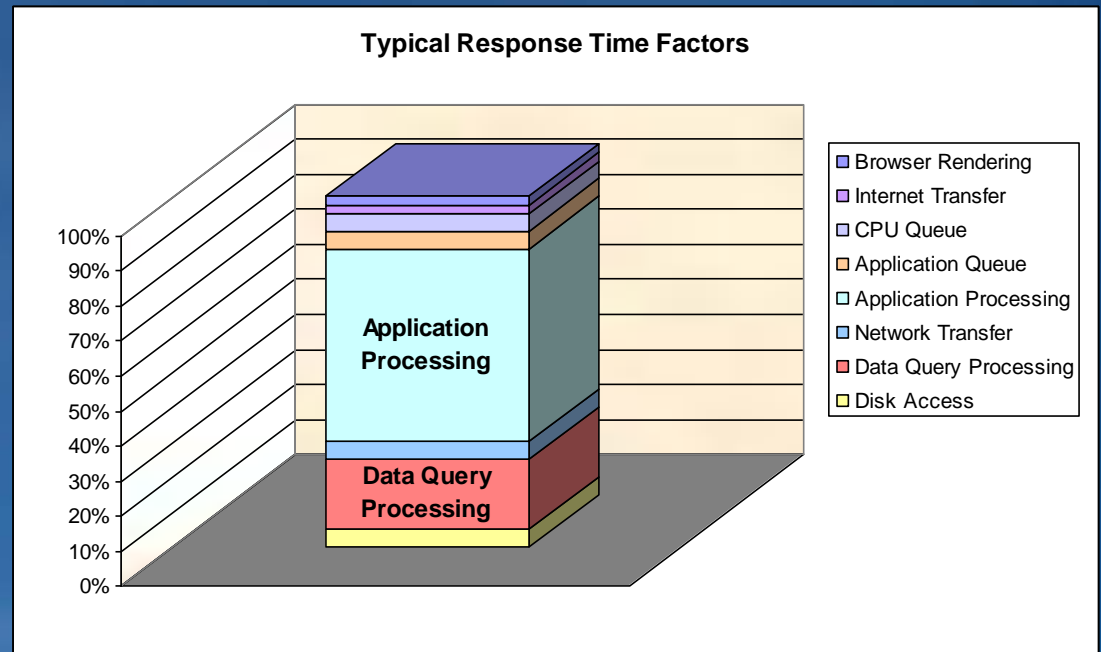
- **Response Time = Service Time + Queue Time**

– Service Time represents CPU processing at the various tiers

- Browser Client CPU Processing
- Web Server CPU Processing
- Application Server CPU Processing
- Data Server CPU Processing

– Queue Time represents time delay

- Network Latency
- Disk Access
- Application Queue
- CPU Queue

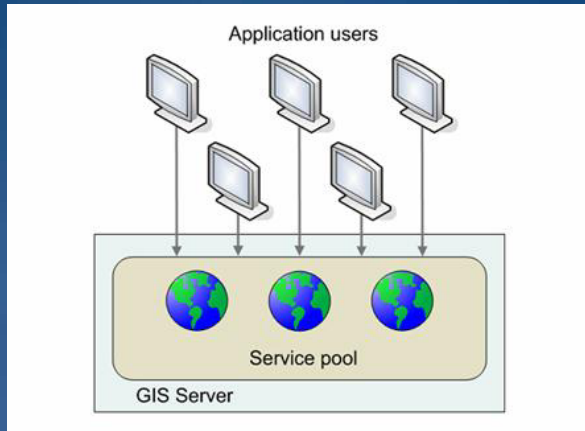




# Publishing GIS Services

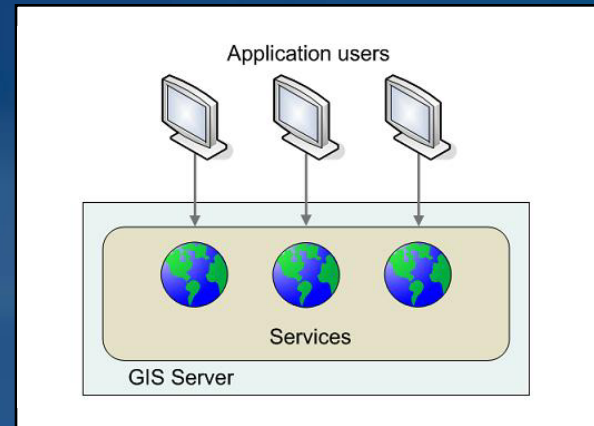
## Object Pooling

### Pooled Services



- State information (e.g., Current extent, layer visibility, etc.) maintained in web server / browser
- **Scales better**

### Non-Pooled Services



- Typically holds its reference to the service for the duration of the application's session
- Number of users on the system can have no more than a 1:1 correlation with the number of running service instances
- Required for Editing Task ADF
- Computationally expensive – New instances are started for each session

# Publishing GIS Services

## *Object Pooling*

- Define Min-Max instances
- Instances are distributed across all host servers

ArcGIS Server - Map Service Properties

General | Parameters | Capabilities | Pooling | Processes

Pooling

This service should be:

Pooled - Used repeatedly by many clients.

Not pooled - Used by a single client and disposed of after use.

Minimum number of instances: 1

Maximum number of instances: 2

Timeouts

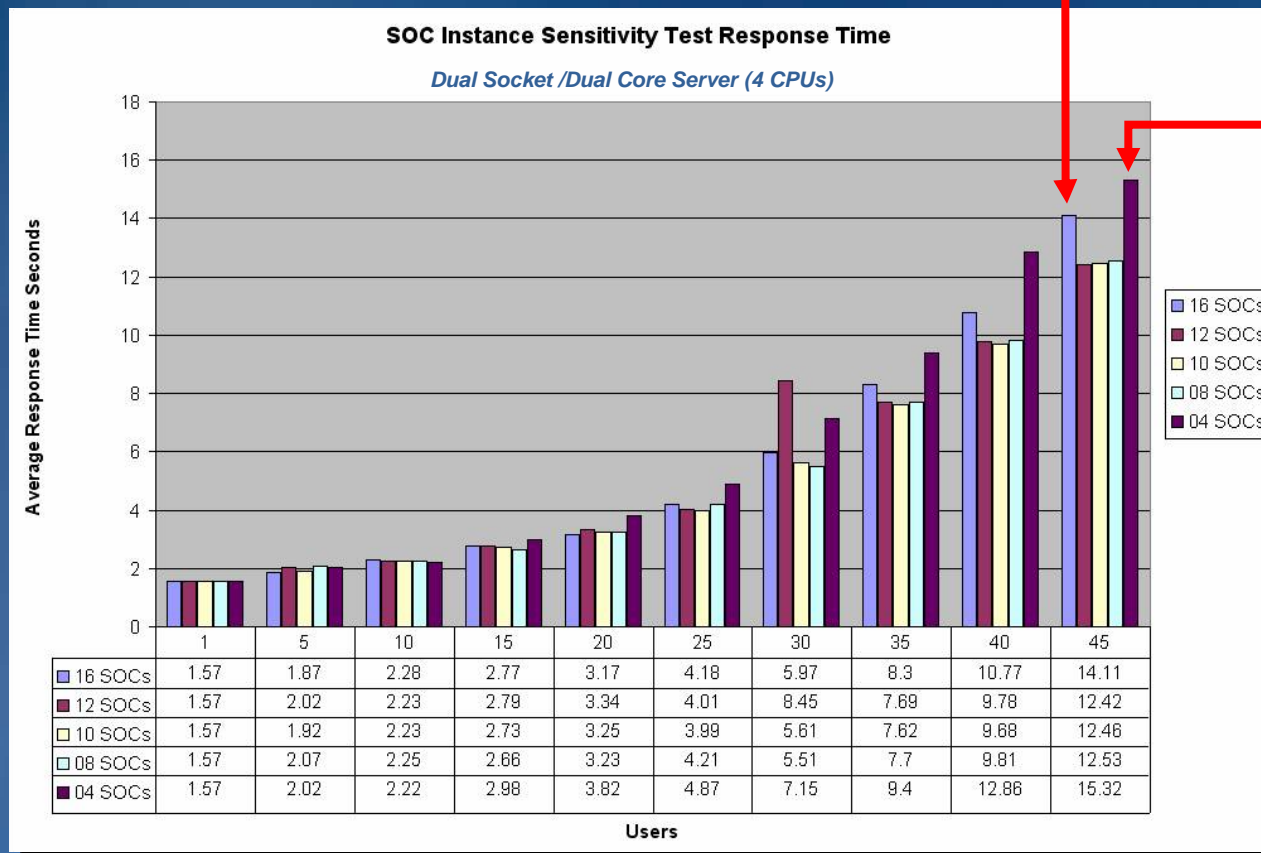
The maximum time a client can use a service: 600 seconds

The maximum time a client will wait to get a service: 60 seconds

OK Cancel Apply

# Publishing GIS Services (Mxd)

## Object Instances



Too many instances creates CPU competition

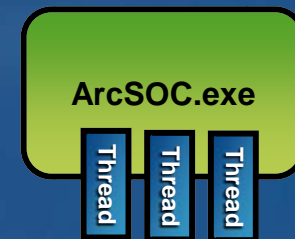
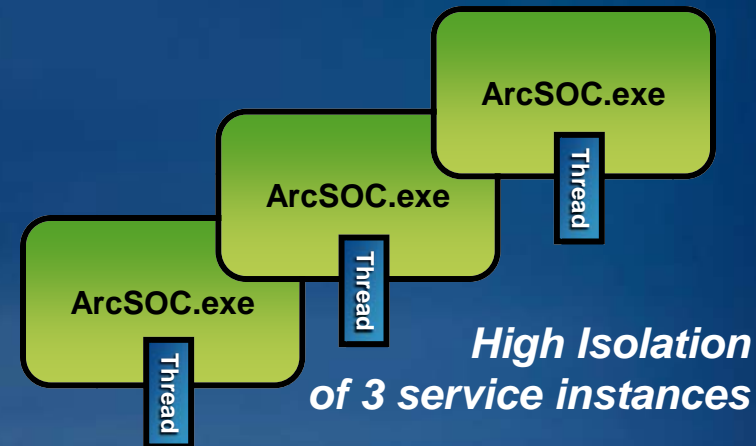
Too few instances creates resource deficiency

**Recommendation:** Limit the number of service instances to 2-4 instances per CPU core (typical).

# Publishing GIS Services

## *Process Isolation*

- **High Isolation:** each service instance runs as a single thread in a dedicated ArcSOC.exe process.
- **Low Isolation:** many service instances run as separate threads in each ArcSOC.exe process.
- **Recommendation:** Use high isolation
  - A failed instance is “isolated” to one ArcSOC.exe process

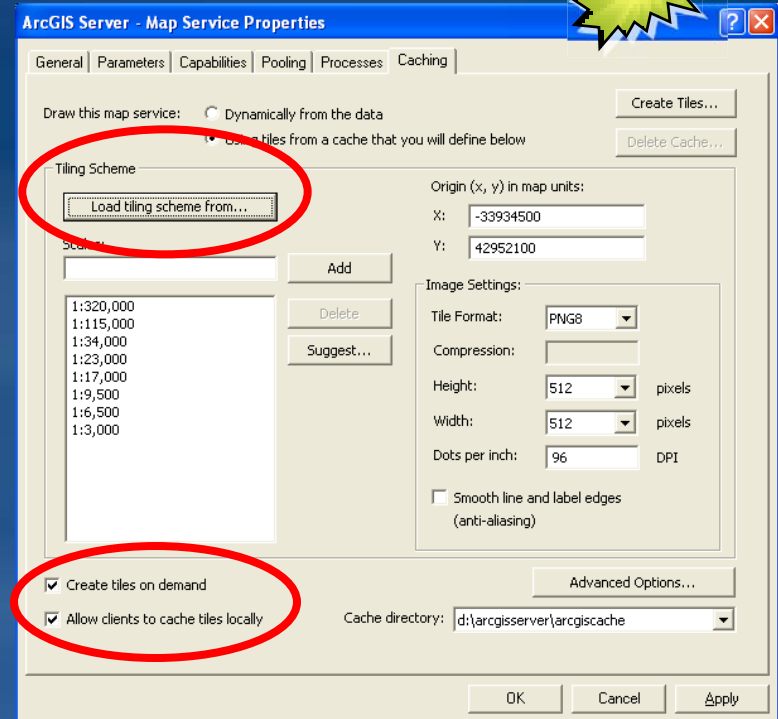


**Note:** At 9.2, low isolation max threads is 4. At 9.3, default is 8 and adjustable.

# Publishing GIS Services

## Cache Creation

- Can be a very time consuming
  - Build it for a small area to test
  - Use “Cache On Demand”
  - Cache configuration available through ArcGIS Server Manager
- For cache tile sizing – use default 512 x 512. Smaller tiles sizes increase end-user network traffic & consume more disk space.
- For higher aesthetics, use Anti-Aliasing.

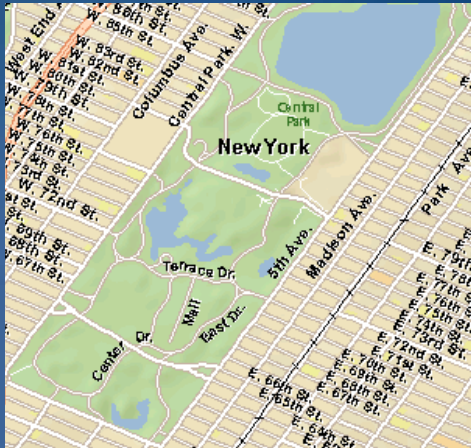


Tile Size	Files	Size on Disk	Creation Time
512x512	19,000	0.2 GB	1 hour
128x128	311,000	1.2 GB	5 hours

# Publishing GIS Services

## Cache Creation

No Anti-aliasing



Anti-aliasing

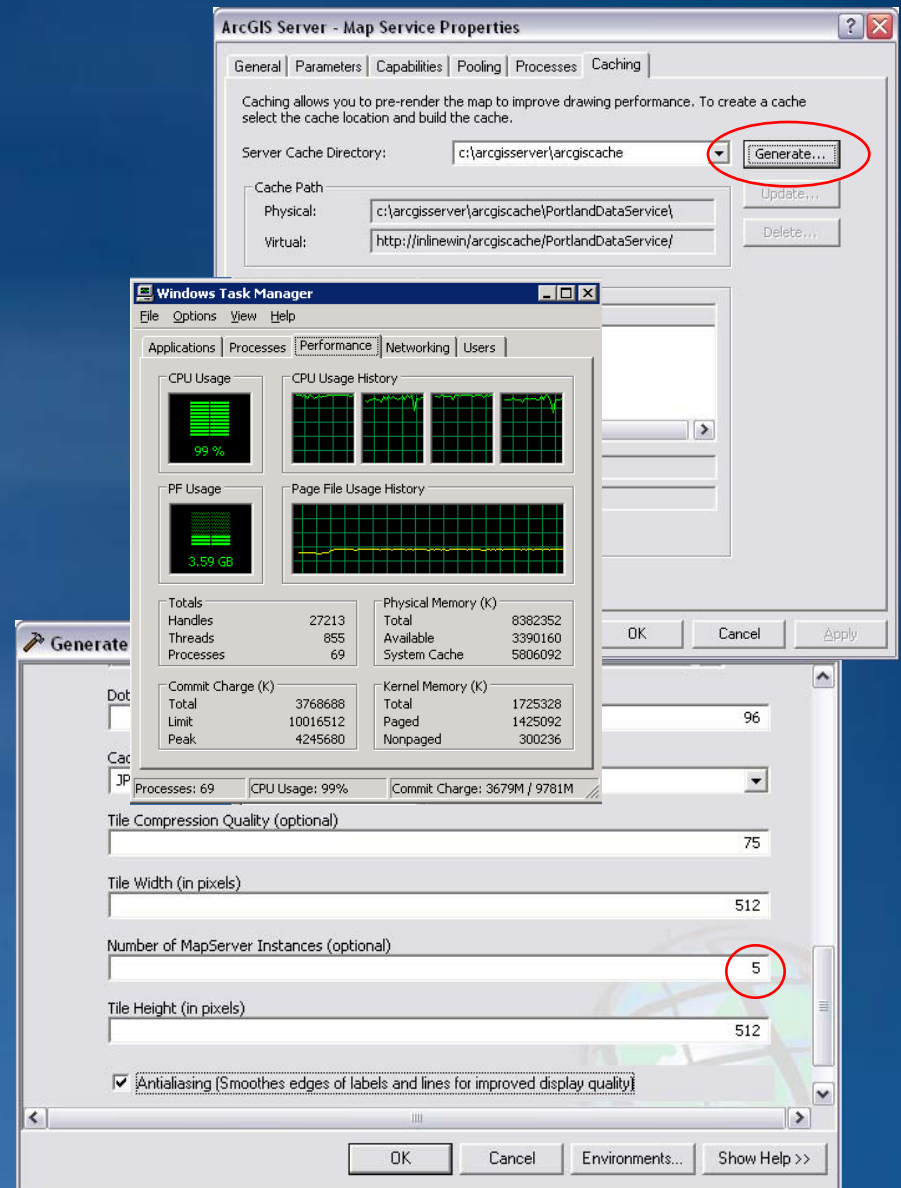


- Anti-aliased tiles are **rendered at finer resolution** followed by **down sampling**
  - Smooths the edges of labels and lines by blending them with the background.
  - The resulting screen display quality is better than standard rendering in ArcMap.
  - **Cache generations times can double** with Anti-aliasing enabled.

# Publishing GIS Services

## Cache Creation

- Cache generation runs as a “batch process” and for the most part consumes a CPU.
- Recommended number of SOC processes is **N+1**, where N is the number of available CPU cores.
- The additional SOC will consume any “left-over” CPU cycles while busy SOCs are waiting on data.
- **Too many SOC processes will cause CPU competition.**



# Publishing GIS Services

## *Output Image Types*

- Output image size varies by format and underlying data type.  
Examples of 600 x 400 pixel images



**JPEG = 76 KB**



**PNG24 = 316 KB**



**BMP = 703 KB**

*Raster and Vector  
Data*



**JPEG = 70 KB**



**PNG24 = 30 KB**



**BMP = 703 KB**

*Vector Only  
Data*

- **Recommendation:**
  - Use appropriate output type to support applications while minimizing impact to network. Generally, raster data is best served in a JPEG format, while vector data is best served in a PNG format. Use PNG32 to support transparency.



# Publishing GIS Services

## *Mobile Cache*

- Build map cache slightly larger than the extent your field worker will be working at.
- Build cache for the entire extent of your background layers (avoids synchronization)
- Keep background data as small as possible (device storage issues)
- Load cache onto devices **before** going out into the field (provisioning).



# Publishing GIS Services

## Geoprocessing



- If possible use **Execution Type = Synchronous**

ArcGIS Server - Geoprocessing Service Properties

General Parameters Capabilities Pooling Processes

Execution Type:  Synchronous  Asynchronous

The tools exposed by the Geoprocessing Service are stored in:

A toolbox

Toolbox: C:\demos\FedUC\Solar\GPServices\SolarRoofTools

A map

Map Document:

Data Frame: Change...

Result Map Service: None

Jobs Directory: d:\arcgisserver\arcgisjobs

Virtual Jobs Directory: http://pocono/arcgisjobs

Output Directory: d:\arcgisserver\arcgisoutput

Virtual Output Directory: http://pocono/arcgisoutput

Maximum Number of Records Returned by Server: 500

Show Messages

OK Cancel Apply

# Publishing GIS Services

## *Batch Geocoding*

- Default batch size is 10. Change to between 100 and 400.  9.2
- At 9.3 default batch size is 1000 and should be set no more than 2000.  9.3

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# Creating & Configuring GIS Applications

## Connecting to ArcGIS Server

- Clients Applications should use **Internet Connections** to ArcGIS Server unless Local Connections are required (e.g. Web Editing Task).

The 'General' dialog box is titled 'General' and contains the following fields and options:

- Choose the type of ArcGIS Server connection:**
  - Internet
  - Local
- Server URL:**
- Host Name:**
- Authentication (Optional):**
  - User Name:**
  - Password:**
  - Save Username/Password

Buttons at the bottom: < Back, Finish, Cancel

ArcGIS Desktop Dialog

The 'Add Layers' dialog box shows the following configuration:

- Layers in:** Catalog
- Buttons:** Add GIS Server, Remove GIS Server
- Table:**

Name	Type
http://pocono/arcgis/services	ArcGIS Server Internet
pocono	ArcGIS Server Local
ArcGIS Online	ArcGIS Server Internet

Buttons at the bottom: Show Details, Add, Close

ArcGIS Server Manager Dialog

# Creating & Configuring GIS Applications

## *Web ADF Map Viewer Application*

- **9.2 SP3**

- .NET memory utilization has been improved.
- .NET TOC issues have been resolved.

- **9.2 SP4**

- Overview Map no longer causes significant performance impact

For Web ADF, custom application that does not require seamless pans, set the Properties of the Map control:

- **EnableTileCaching = FALSE**
- **EnableContinuousCallback = FALSE**

# Creating & Configuring GIS Applications - ADF

## *Blending of Cache and Dynamic Services*

- Performance for browser blending in .NET is slow for 9.2 (Java does not have this issue).
- For 9.2, server-side blending in the SOC is more stable and supports more concurrent users.
- For 9.3, browser-side blending is the recommended approach and much higher performing.



9.2



9.2



9.3

# Creating & Configuring GIS Applications/Services

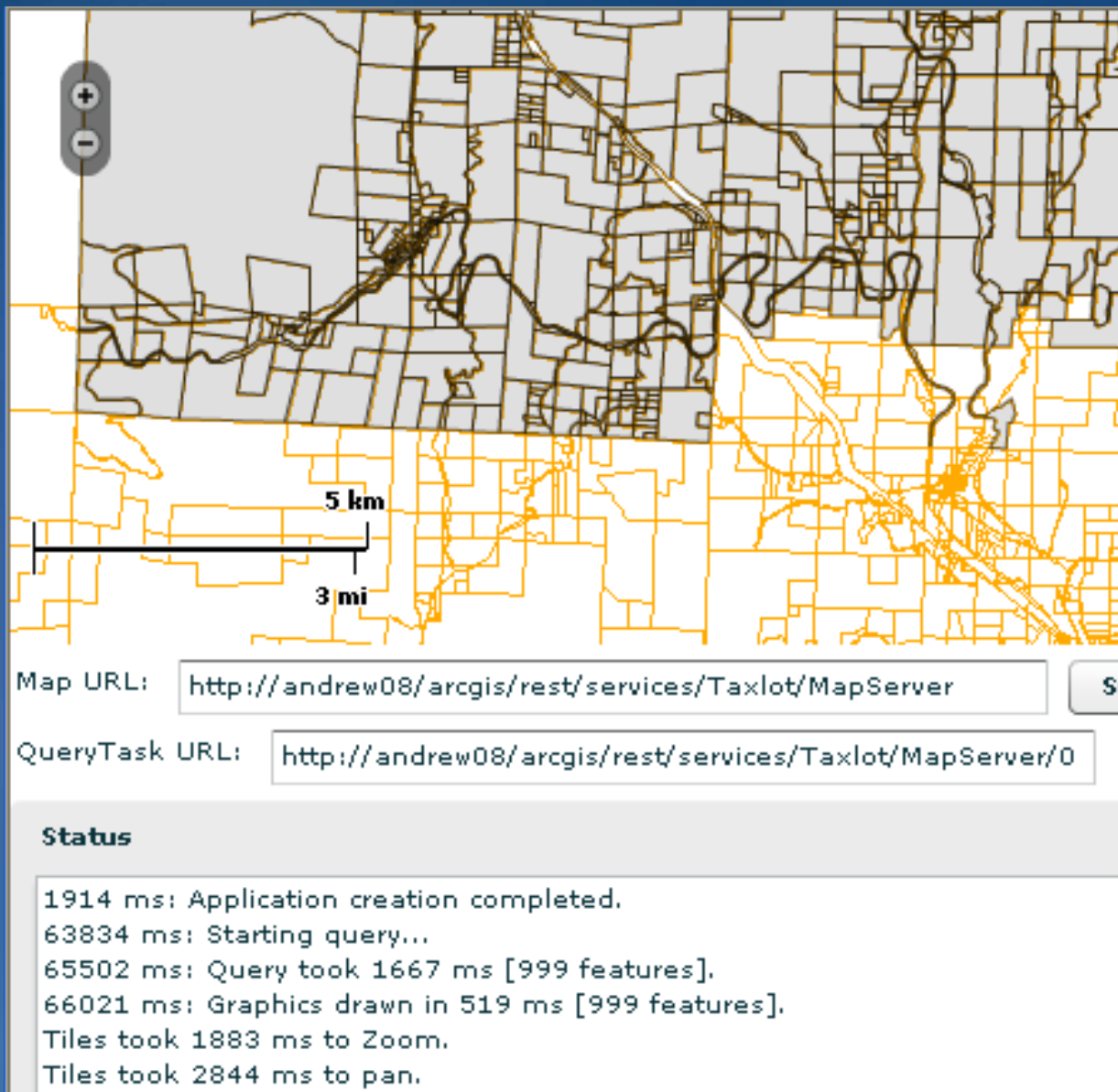
## *LSASS CPU & Memory*

- Local Security Authentication Server system process (lsass.exe) grows in CPU usage and memory utilization under heavy load.
- Solution:
  - Create a new IIS Application Pool and set its identity to the ArcGIS Web Services account.
  - Set the ArcGIS Web Services and REST applications to not use impersonation.
  - Add the ArcGIS Web Services and REST applications to the newly created application pool.
  - Windows\_Server\_2003
  - <http://support.esri.com/index.cfm?fa=knowledgebase.techarticles.articleShow&d=32622>



# Creating & Configuring GIS Applications/Services

## MapService



The screenshot displays a web-based GIS application interface. At the top, there is a map showing a street grid and a river. A scale bar indicates 5 km and 3 mi. Below the map, there are two input fields for URLs. The first field is labeled "Map URL:" and contains the text "http://andrew08/arcgis/rest/services/Taxlot/MapServer". The second field is labeled "QueryTask URL:" and contains the text "http://andrew08/arcgis/rest/services/Taxlot/MapServer/0". Below the URL fields, there is a section titled "Status" which contains a log of events:

```
1914 ms: Application creation completed.  
63834 ms: Starting query...  
65502 ms: Query took 1667 ms [999 features].  
66021 ms: Graphics drawn in 519 ms [999 features].  
Tiles took 1883 ms to Zoom.  
Tiles took 2844 ms to pan.
```

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# Performance Tips

## Database

- **Optimize and tune your database**
- **Use Direct Connect to connect your map service to your database**
- **Store file-based data (i.e., file geodatabase) on the SOC server**
- **Use Spatial and Attribute indexes**

# ArcGIS Server Administration

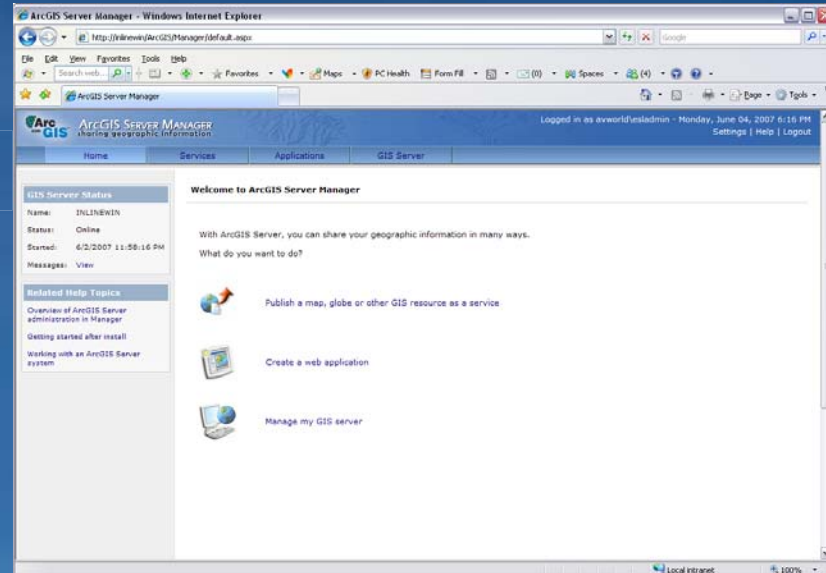
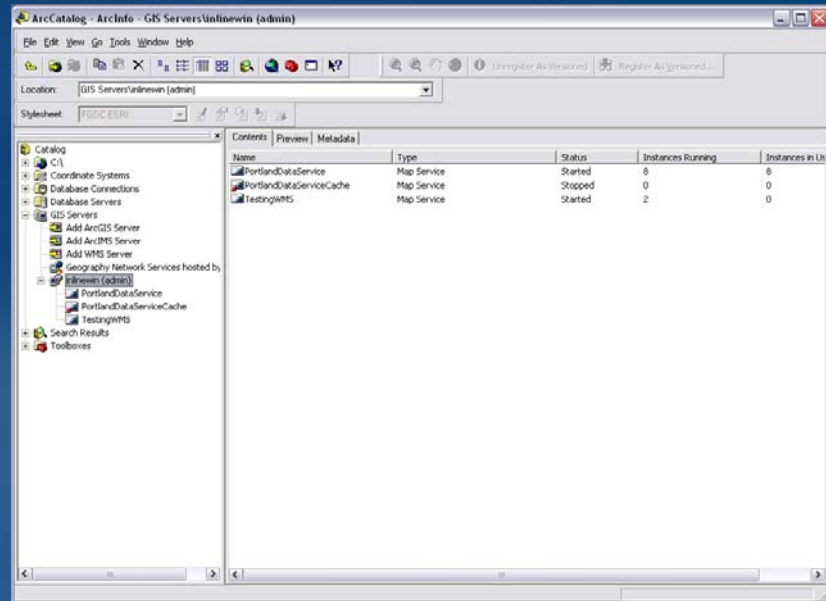
## Administration Tools

- **ArcCatalog**

- Administer ArcGIS Server
- Consume ArcGIS Server services

- **Server Manager**

- Web Based Interface
- Publishes Services
- Administer ArcGIS Server
- Creates Template-Style Web Applications
- Troubleshoot Using Logs
- Secure Web applications and services (9.3)



# ArcGIS Server Monitoring

## Service Usage Time Statistics (ArcCatalog)

- **Usage Time**

- Start to finish time for service instance use (service processing time)

- Mostly useful for pooled services

The screenshot shows the 'ArcGIS Server Properties' dialog box with the 'Statistics' tab selected. The 'Service(s)' is set to 'PortlandDataService', 'Host(s)' to 'inlinewin', 'Type' to 'SO, Usage Time', and 'Interval' to 'Last 60 seconds'. A 'Show Statistics' button is visible. The 'Statistics Time Range' shows a start time of 2007-06-12T16:29:52 and an end time of 2007-06-12T16:30:52. The 'Service Usage Time' section displays the following statistics:

Statistic	Value
Total number of requests	2
Number of requests succeeded	2
Number of requests timed out	0
Avg usage time	1.492500 Seconds
Min usage time	0.938000 Seconds
Max usage time	2.047001 Seconds
Sum usage time	2.985001 Seconds

The 'Avg usage time' value of 1.492500 Seconds is circled in red in the original image. At the bottom of the dialog are 'OK', 'Cancel', and 'Apply' buttons.

# ArcGIS Server Monitoring

## Service Creation Time Statistics (ArcCatalog)

- **Creation Time**

- Amount of time to start the service (load the MXD, etc.)

The screenshot shows the 'ArcGIS Server Properties' dialog box with the 'Statistics' tab selected. The 'Service(s)' is set to '<All>', 'Host(s)' to '<All>', 'Type' to 'SO Creation Time', and 'Interval' to 'Last 60 seconds'. A 'Show Statistics' button is visible. The 'Statistics Time Range' shows a start time of 2007-06-12T16:34:52 and an end time of 2007-06-12T16:35:52. The 'Service Creation Time' statistics are displayed in a scrollable area, with the 'Avg creation time: 1.905998 Seconds' line circled in red.

Service Creation Time:
Total number of requests: 1
Number of requests succeeded: 1
Number of requests failed: 0
<b>Avg creation time: 1.905998 Seconds</b>
Min creation time: 1.905998 Seconds
Max creation time: 1.905998 Seconds
Sum creation time: 1.905998 Seconds

# ArcGIS Server Monitoring

## Service Wait Time Statistics (ArcCatalog)

- **Wait Time**

- Amount of time a client waits to get access to a service instance (SOM queue time)

The screenshot shows the 'ArcGIS Server Properties' dialog box with the 'Statistics' tab selected. The 'Service(s)' is set to 'PortlandDataService', 'Host(s)' to 'inlinewin', and 'Type' to 'SO. Wait Time'. The 'Interval' is 'Last 60 seconds'. A 'Show Statistics' button is visible. The 'Statistics Time Range' shows a start time of 2007-06-12T16:32:48 and an end time of 2007-06-12T16:33:48. The 'Service Wait Time' section displays the following statistics:

Service Wait Time:	
Total number of requests:	6
Number of requests succeeded:	6
Number of requests failed:	0
Number of requests timed out:	0
Avg wait time:	0.002667 Seconds
Min wait time:	0.000000 Seconds
Max wait time:	0.016001 Seconds
Sum wait time:	0.016001 Seconds

The 'Avg wait time' value is circled in red in the original image. At the bottom of the dialog are 'OK', 'Cancel', and 'Apply' buttons.

# ArcGIS Server Log Files

## Manager Logs

- Use “Normal” mode for standard operations
- Use “Detailed” or “Debug” mode for troubleshooting

The screenshot shows the ArcGIS Server Manager web interface. In the left sidebar, the 'Log Files' link is circled in red. The main content area displays the 'Server Activity Log' with a table of log entries. The table has columns for Level, Message, Time, Configuration, and Host. The log entries include various warnings and normal messages related to layer invalidation and cache directory settings.

Level	Message	Time	Configuration	Host
Warning	The Layer:'Major Connector Roads (200k to 0)' in Map:'Business Analyst' is invalid.	2007-05-25T23:59:21	Dallas.MapServer	eslibmb13
Normal	CacheDir = c:\arcgisserver\arcgiscache\Dallas\	2007-05-25T23:59:21	Dallas.MapServer	eslibmb13
Normal	Map Business Analyst HasSingleFusedMapCache: 0	2007-05-25T23:59:21	Dallas.MapServer	eslibmb13
Warning	The Layer:'demo.SANGIS.RASTER_JPEG50' in Map:'Layers' is invalid.	2007-05-27T00:00:05	Sangis.MapServer	eslibmb13
Warning	The Layer:'Interstates (20mil to 200k)' in Map:'Business Analyst' is invalid.	2007-05-27T00:00:05	SF.MapServer	eslibmb13
Warning	The Layer:'Interstates (20mil to 200k)' in Map:'Business Analyst' is invalid.	2007-05-27T00:00:05	Dallas.MapServer	eslibmb13
Normal	CacheDir = c:\arcgisserver\arcgiscache\Sangis\	2007-05-27T00:00:05	Sangis.MapServer	eslibmb13
Warning	The Layer:'Major Connector Roads (200k to 0)' in Map:'Business Analyst' is invalid.	2007-05-27T00:00:05	Dallas.MapServer	eslibmb13

The screenshot shows the 'Server Logging Properties' dialog box. It contains the following fields:

- Log file path: C:\Program Files\ArcGIS\server\user\log\
- Log file size: 10 Megabytes
- Log level: Normal (selected, circled in red)

Buttons for 'Save' and 'Cancel' are visible at the bottom right.

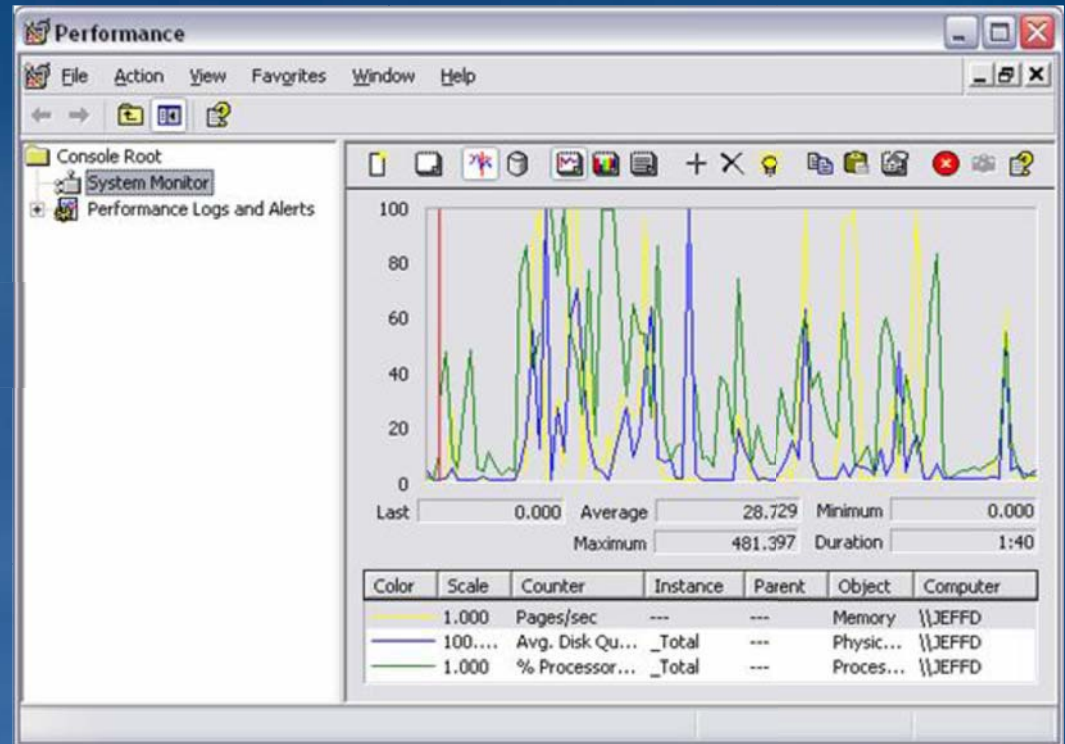
Default Log Location: C:\Program Files\ArcGIS\server\user\log



# System Monitoring

## Operating System Tools

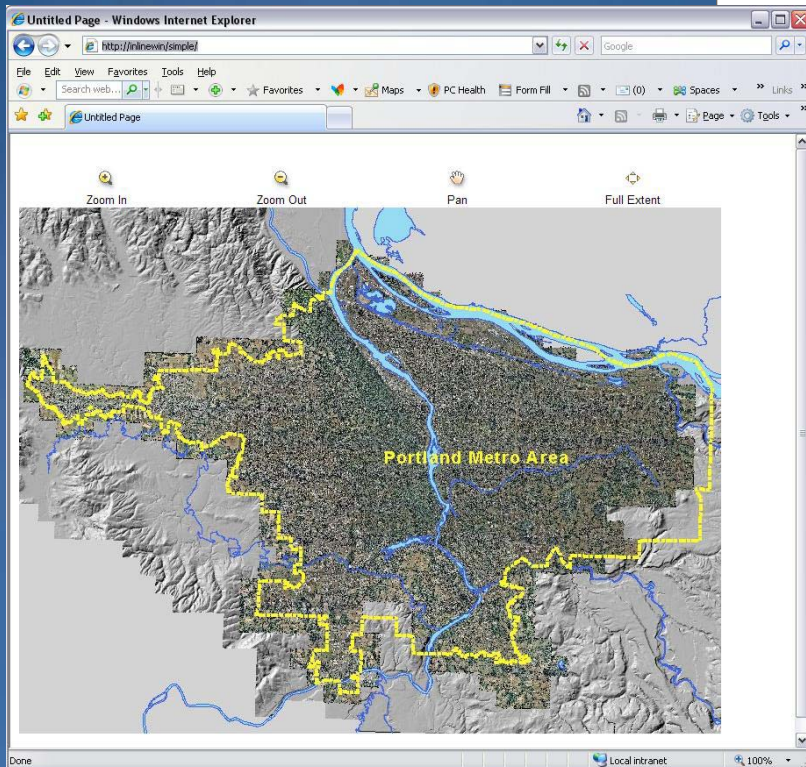
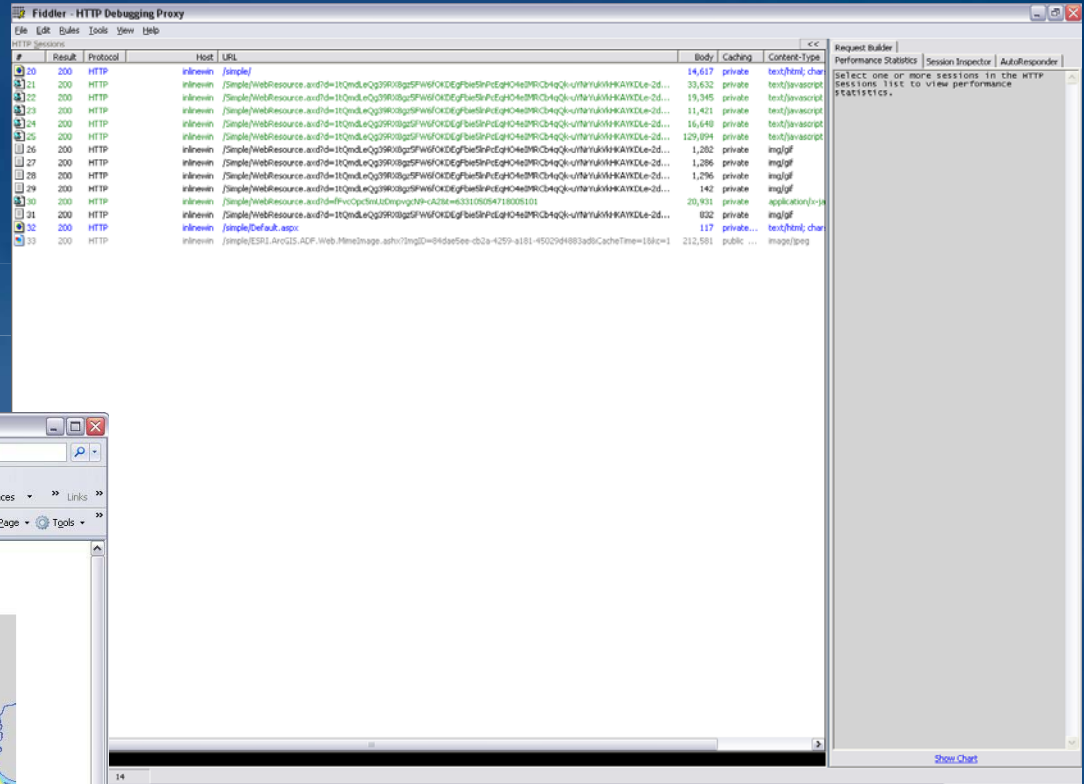
- Windows – Perfmon
- Linux – DSTAT, IOSTAT, VMSTAT, PS
- Unix – DSTAT, NMON, IOSTAT, VMSTAT, PS



# System Monitoring

## HTTP Conversation

- Microsoft's Fiddler
  - HTTP debugging proxy
  - <http://www.fiddlertool.com/>

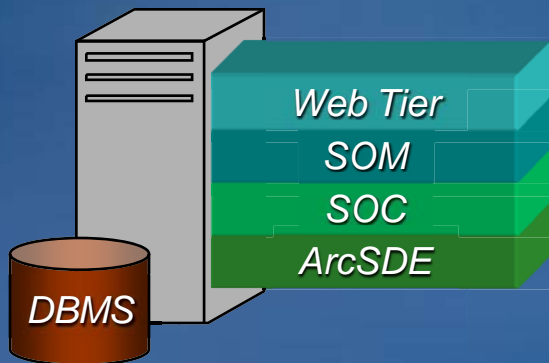


# Topical Outline

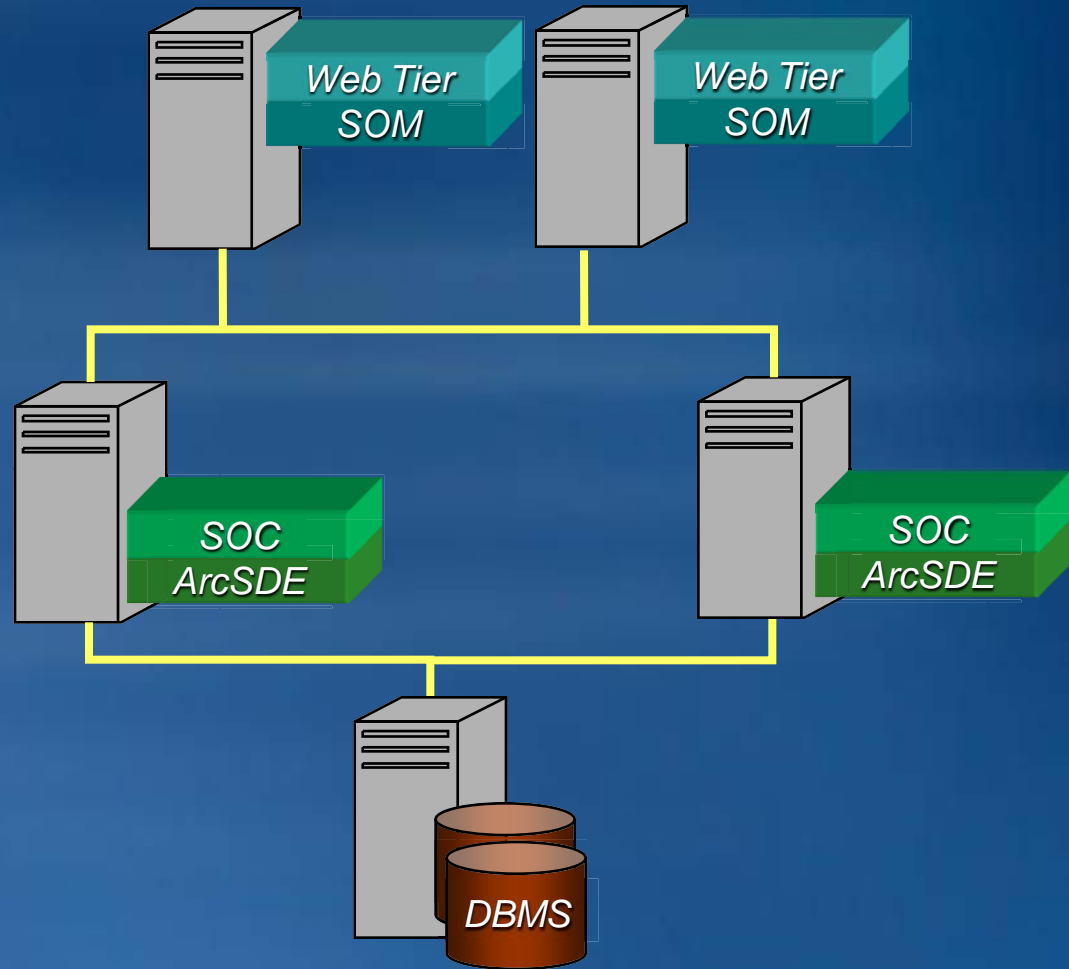
- **Preparing GIS documents**
- **Publishing GIS services**
- **Creating and Configuring GIS applications**
- **Administration & System Monitoring**
- **Deployment Architectures**

# Deployment Architectures

## *Adding Capacity*



Single Machine Scenario



Multiple Machine Scenario

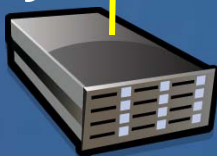
# Deployment Architectures

## *Small Capacity Enterprise (Single Machine)*

Clients



Reverse Proxy



ArcGIS Server



Comments:

–Simple Setup

–Use Application Server (AS) connections if RDBMS is dedicated.

–Use local drives for FGDB/SHP data and output directories

# Deployment Architectures

## **Large Capacity Enterprise (Multiple Machine – Simple)**

Network Load Balancer



- **Advantages:**

- Few bottlenecks
- Easy scaling

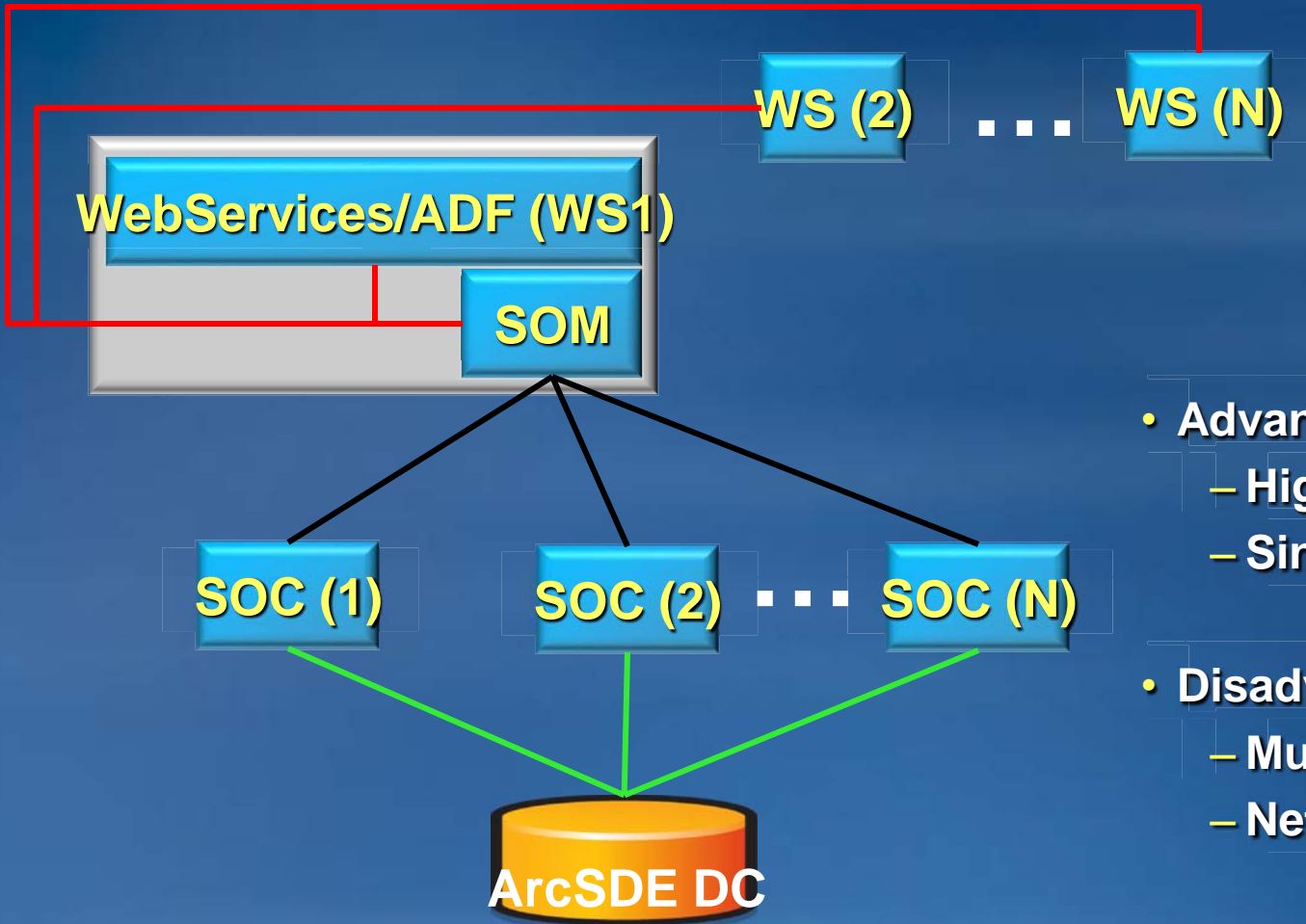
- **Disadvantages:**

- Better throughput possible (SOCs burdened by other components)
- Must replicate configurations
- Must replicate Security
- Sticky sessions if state required

# Deployment Architectures

## *Large Capacity Enterprise (Multiple Machine - MIME)*

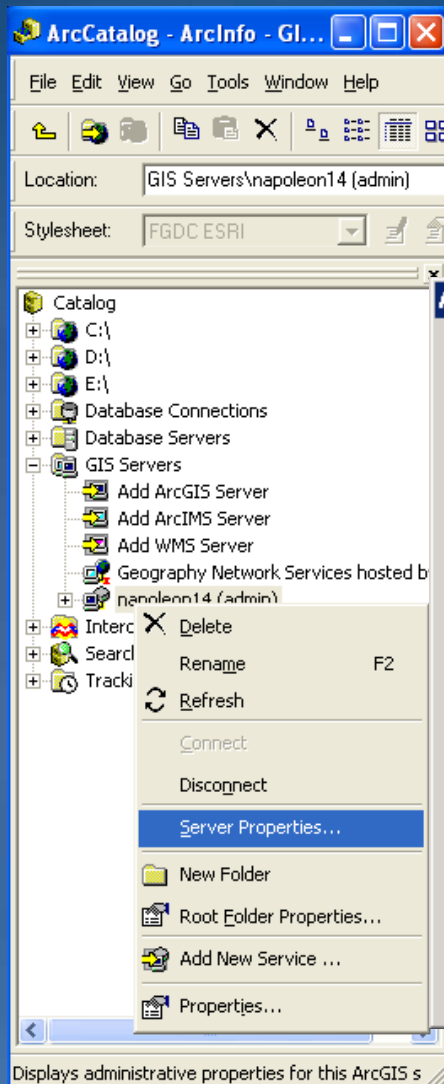
Network Load Balancer



- Advantages:
  - Highest Throughput
  - Single service config
- Disadvantages:
  - Must replicate security
  - Network Bottlenecks

# Deployment Architectures

## *Adding Additional Servers*



### ArcGIS Server Properties

General Hosts Directories Statistics Types

The list below shows the machines available to host services.  
NOTE: you need to add at least one machine to use the server.

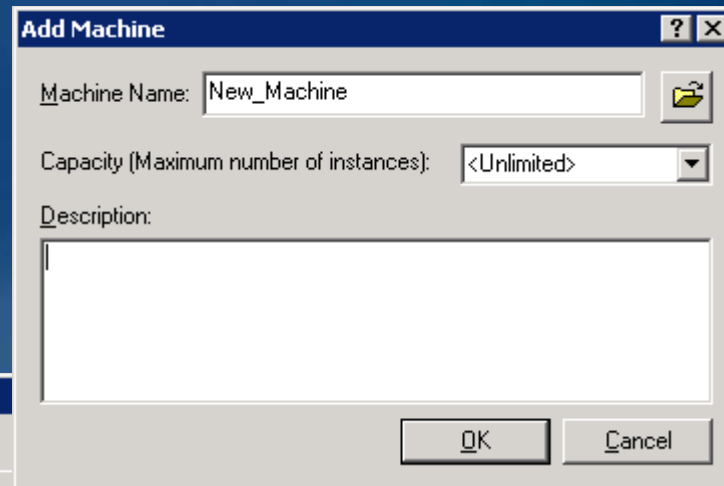
Machine Name	Description	Capacity
napoleon14		<Unlimited>

Add...

Remove

Edit...

OK Cancel Apply





# Deployment Architectures

## Firewalls

- ESRI does not recommend firewalls between ArcGIS Server components but rather recommends the use of a **Reverse Proxy** web server for securing access to Trusted systems *For example:*



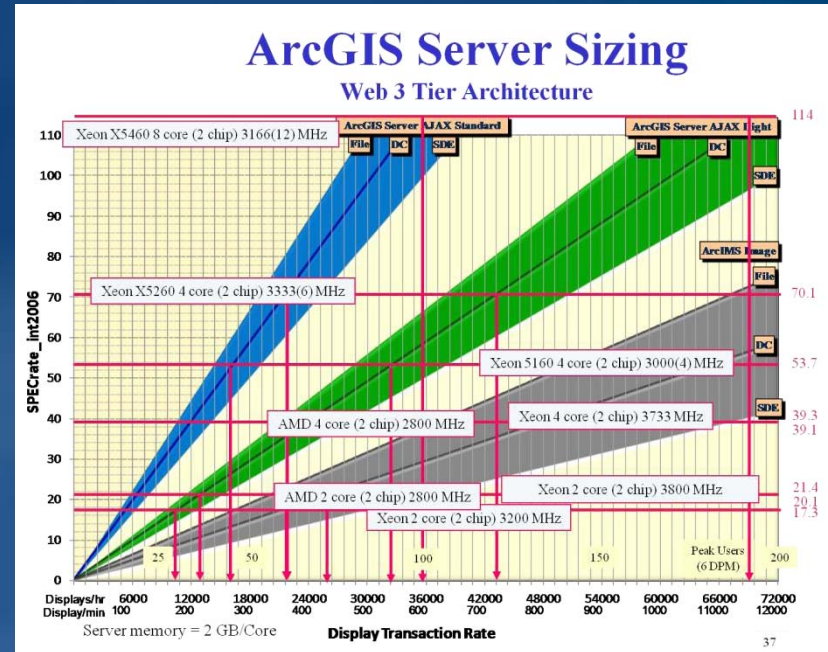
More Information at:

- Server Help: Firewalls and Server
- Support KB Article

# Deployment Architectures

## Capacity Planning

- Use your testing and staging landscapes (your data, applications and hardware)
- ESRI Professional Services Enterprise Consulting
- System Design Strategies Technical Resource Document



# Conclusions

- **ArcGIS Server offers a powerful and flexible platform for server-based GIS, but it needs to be architected correctly.**
  - **Preparing GIS documents**
  - **Publishing GIS services**
  - **Creating and Configuring GIS applications**
  - **Defining a deployment architecture**

# More Information

## SERUG

- Designing, Deploying, and Using Cached Map Services Wed 8:30am

## Seminar

### –Creating Effective Web Maps

- Columbia, SC 4/30/2009
- Richmond, VA 5/7/2009
- Nashville, TN 5/19/2009
- Orlando, FL 5/21/2009
- Atlanta, GA 6/4/2009
- Birmingham, AL 6/9/2009

# More Information: Classroom

- **Instructor-Led Training Courses**

- *Introduction to ArcGIS Server*

- *ArcGIS Server: Web Administration Using the Microsoft .NET Framework*

- *Coming soon: Building Web Maps Using the ArcGIS API for JavaScript*

# More Information: Online

## Resource Center: DS2009

- [Best Practices for Designing Effective Map Services](#)
- [Advanced Map Caching Topics](#)
- [ArcGIS Server Performance and Scalability—  
Performance Factors and Optimization](#)
- [ArcGIS Server Performance and Scalability -  
Testing Methodologies](#)

**Thank You  
and  
Enjoy the Conference!**