Performance and Scalability:
Tuning, Testing, and Monitoring

Andrew Sakowicz, asakowicz@esri.com
Steve McCarthy, Steven.McCarthy@Williams.com
Frank Pizzi, fpizzi@esri.com
Agenda

- Process, Tools, Value
- Performance tuning
- Performance testing
- Monitoring
Process, Tools, Value
Process and Tools
Relationship between System Tools

- User Load
- CPU%
- Capacity models
- Performance Tests
System Tools framework
System Tools are not just tools

- Discipline
- Patterns
- Tool
System Tools overview

- **http://www.arcgis.com**
- **owner:EnterpriseImp**
- **Show ArcGIS Desktop Content**
## ArcGIS Monitor

**Demo:** [https://systemmonitoring-emcs.esri.com](https://systemmonitoring-emcs.esri.com)

### Oversee Your Enterprise GIS Usage and Performance

At Esri, we want you to get the most out of your investment in GIS and IT infrastructure. Soon we will offer ArcGIS Monitor, a software tool uniquely tailored to audit the health of your ArcGIS implementations. ArcGIS Monitor will show you insightful information about your system usage and performance, while ensuring that Esri can support you throughout the lifecycle of your GIS. Sign up for news on how Esri can help you improve your system operation and reduce administration costs.

<table>
<thead>
<tr>
<th>ID</th>
<th>Alerts</th>
<th>Collecting Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**System Monitor**

**Tokyo**

[http://go.esri.com/monitor](http://go.esri.com/monitor)
Testing best practices
Definitions
Performance

- Speed, e.g. response time (seconds)
Scalability

- The ability to increase output and maintain acceptable performance
Capacity

• The maximum level of output the system can produce, e.g.
• X cars/sec
• X maps/sec

At capacity

Over capacity
Bottleneck

- Resource(s) limiting the performance or capacity

Think of:
- Lanes - as CPU processor
- Toll - as ArcGIS Server instances
- Cars - as map requests
Test validation
Step Load and Response Time

Response Time (sec) vs. time

Step Load (users)
Resource utilization: CPU, Memory, Network

- CPU Utilization (%)
- Memory used (Mb)
- Network used (Mbps)
- Throughput (req/hr)
- Response Time (sec)
- Step Load (users)
Capacity

User load
Throughput (req/hr)
CPU Utilization (%)
Network used (Mbps)
Response Time (sec)
Memory used (Mb)
Content length (bytes)

Capacity (~ 85% utilization)
Required skill set
Configuration, Tuning, Testing
Tuning methodology
Profile each tier starting from the top

- Total Response Time ($t_1 - t_2$)
- Wait Time
- Usage Time
- Search & Retrieval Time

Browser ➔ Web Server ➔ ArcGIS Server ➔ ArcSOC ➔ ArcSDE/DBMS
Profile application
Fiddler measurement approximately 5.2 seconds

Application performance narrowed down to specific request and map service
Review historical stats of the culprit service
ArcGIS Server 10.3.1 Statistics

- Total requests
- Average response time
- Maximum response time
- Timeouts
- Maximum running instances
- 30 min resolution reports
Review historical stats of the culprit service

System Log Parser
Review historical stats of the culprit service

System Monitor – ArcGIS Server Statistics

<table>
<thead>
<tr>
<th>Alerting</th>
<th>Name</th>
<th>Folder</th>
<th>Type</th>
<th>Throughput (Tr/sec)</th>
<th>Busy Time per Tr (sec)</th>
<th>Transactions</th>
<th>Max</th>
<th>Busy</th>
<th>Free</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary</td>
<td>Summary</td>
<td>Cluster Summary</td>
<td>MapServer</td>
<td>0.117</td>
<td>0.285</td>
<td>431,564</td>
<td>35</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Sample</td>
<td>SampleWorldCities</td>
<td>Root</td>
<td>MapServer</td>
<td>0.100</td>
<td>0.245</td>
<td>420,875</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>test</td>
<td>test1</td>
<td>Root</td>
<td>MapServer</td>
<td>0.017</td>
<td>0.049</td>
<td>5,841</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Portland</td>
<td>Portland_sql_pvtdb</td>
<td>Root</td>
<td>MapServer</td>
<td>0.000</td>
<td>0.000</td>
<td>4,251</td>
<td>8</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>PublishingTools</td>
<td>PublishingTools</td>
<td>System</td>
<td>GPServer</td>
<td>0.000</td>
<td>0.000</td>
<td>746</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>WorldCities_secured</td>
<td>WorldCities_secured</td>
<td>Root</td>
<td>MapServer</td>
<td>0.000</td>
<td>0.000</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Geometry</td>
<td>Geometry</td>
<td>Utilities</td>
<td>GeometryServer</td>
<td>0.000</td>
<td>0.000</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>World_Map</td>
<td>World_Map</td>
<td>Root</td>
<td>MapServer</td>
<td>0.000</td>
<td>0.000</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Profile mxd of the culprit map service

Mxdperfstat

### Table 1: Layer Name and Refresh Time

<table>
<thead>
<tr>
<th>Item</th>
<th>At Scale</th>
<th>Layer Name</th>
<th>Refresh Time (sec)</th>
<th>Recommendations</th>
<th>Features</th>
<th>Vertices</th>
<th>Labeling</th>
<th>Geography Phase (sec)</th>
<th>Graphics Phase (sec)</th>
<th>Cursor Phase (sec)</th>
<th>DBMS CPU</th>
<th>DBMS LIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>167,935,665</td>
<td>SDE.GridPoint</td>
<td>4.75</td>
<td>run DBMS trace, oraCPU=4.74; run DBMS trace, check oracle execution plan; oraLIO=130,936; check if index exist for query def attributes;</td>
<td>1,998</td>
<td>False</td>
<td>4.74</td>
<td>.00</td>
<td>4.56</td>
<td>4.74</td>
<td>130,936</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Source, Layer Type, Spatial Reference, and Query Def

<table>
<thead>
<tr>
<th>DBMS LIO</th>
<th>DBMS PIO</th>
<th>Source</th>
<th>LayerType</th>
<th>Layer Spatial Reference</th>
<th>LayerQueryDef</th>
</tr>
</thead>
<tbody>
<tr>
<td>130,936</td>
<td></td>
<td>cstriDBMS_Grace, asakowicz, sde; oracle$asakowicz:1521/gis2,sde</td>
<td>cstriGeometryPoint</td>
<td>GCS_WGS_1984</td>
<td>ID&lt;1000</td>
</tr>
</tbody>
</table>
Oracle Trace

Compare elapsed time

Elapsed time slightly changed due to different test runs
Oracle Execution plan

Inefficient spatial index
### Mxdperfstat - WorldSQLExpress.mxd

mxdperfstat10.4.exe -mxd WorldSQLExpress.mxd -scale 100000000

- mxdperfstat10.4.exe -mxd WorldSQLExpress.mxd -scale 100000000

- Compare to FGDB

### mxdperfstat

7/9/2016 4:09:37 PM  
WorldSQLExpress.mxd  
layerCount=2  
GCS WGS 1984  
eStrDecimalDegrees  
X= .00 Y= -44.67 width= 1200 height= 1000

<table>
<thead>
<tr>
<th>Scale</th>
<th>Refresh Time (sec)</th>
<th>VisibleLayers</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000,000</td>
<td>38.84</td>
<td>2</td>
</tr>
</tbody>
</table>

**Map Display Performance (sec) for each scale**

<table>
<thead>
<tr>
<th>Item</th>
<th>At Scale</th>
<th>Layer Name</th>
<th>Refresh Time (sec)</th>
<th>Recommendations</th>
<th>Features</th>
<th>Vertices</th>
<th>Labeling</th>
<th>Geography Phase (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100,000,000</td>
<td>SDE.cities</td>
<td>.05</td>
<td></td>
<td>2,274</td>
<td>True</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100,000,000</td>
<td>SDE.country</td>
<td>38.20</td>
<td>simplify geometry. vertices setchek=7079678;</td>
<td>543</td>
<td>False</td>
<td>38.19</td>
<td></td>
</tr>
</tbody>
</table>
Testing
Testing Objectives

- Meet Service-Level Agreement (SLA)
- Bottlenecks analysis
- Capacity planning
- Benchmarking different alternatives
Testing process

- Infrastructure: Hardware and Software
- GIS Services
- Application
Required skill set
Configuration, Tuning, Testing
System Test for Web
GIS Test Automation

- ArcGIS Services
  - Mapping
  - Feature Service
  - OGC
  - Geocoding
  - Image Service
  - Network Analyst
  - Geoprocessing
  - Tile Cache
- Application Testing
- Discipline relevant report
# Web test tools feature comparison

<table>
<thead>
<tr>
<th>Tool</th>
<th>Cost</th>
<th>Learning Curve</th>
<th>OS Metrics</th>
<th>GIS Data Generation</th>
<th>GIS Test Automation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Runner</td>
<td>High</td>
<td>High</td>
<td>Windows/Linux</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Visual Studio</td>
<td>Medium</td>
<td>High</td>
<td>Windows</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>JMeter</td>
<td>Free</td>
<td>High</td>
<td>Requires additional plugin</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>System Test</td>
<td>Free</td>
<td>Low</td>
<td>Windows/Linux</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Tech Support by Esri PS as part of consulting support
Demo: Dynamic Map Service

Dynamic Map Services Benchmark: Performance

A load test is defined by a given map service and during this type of testing:
1. Learn how to add ArcGIS Server services and a data to the service.
2. Create a web test and a load test.
3. Run test and validate results.

In this tutorial, you locate a map service that is sourced to the SampleWorldCities dataset that comes included with ArcGIS Server. You identify the service that will be able to run the load test.

Important: ArcGIS Server 10.1 or higher is required. Make sure the SampleWorldCities default map service that comes with ArcGIS Server is enabled before running the load test.

Scenario

Your supervisor is planning to publish a world map that allows users to view cities. They would like to know what performance metrics to expect.

High Level Steps:
1. Create a project.
2. Add ArcGIS Server services.
3. Create test data.
5. Start load test.
6. Validate results.
System Test output
System Designer output
Advanced features

- Transaction based
- Import Har
- Editing
- Network
- GP
System Monitor Overview
Monitoring overview
Monitoring Enterprise GIS
Challenges

- Multiple administrators
- Multiple disparate monitoring/diagnostic tools
- Data collected in a reactive fashion: on demand and for limited time
- Correlation of data with different timestamp is difficult
- ArcGIS administrators do not have access to all tools, data and reports
- Challenging to quickly identify the root cause and take appropriate measures
Motivation: Growing complexity of ArcGIS Enterprise

Requires dependable infrastructure

Certificates
Load balancer
Firewall
ArcGIS Web Adaptor
Portal for ArcGIS
Storage with immediate consistency

ArcGIS Server
ArcGIS Data Store
Database
When problems arise, what is the root cause?
ArcGIS Monitor Demo: https://systemmonitoring-emcs.esri.com

ArcGIS Monitor - Status

- Status
- Alerts (2)
- Web
- ArcGIS
- Database
- Cloud
- Infrastructure
- Usage
- Geoinfo
- Extensions
- License

Status July 8, 2017 9:21

ID Alerts Collecting Failures
1 0 0
2 0 0
3 0 0
4 1 0
5 0 0
6 0 0
7 0 4
8 0 0

System Monitor

ArcGIS Monitor

Oversee Your Enterprise GIS Usage and Performance

At Esri, we want you to get the most out of your investment in GIS and IT infrastructure. Soon we will offer ArcGIS Monitor, uniquely tailored to audit the health of your ArcGIS implementations. ArcGIS Monitor will provide you with insightful information about your system usage and performance, while ensuring that Esri can support you throughout the lifecycle of your GIS. Sign up now to learn how ArcGIS Monitor can help you improve your system operation and reduce administration costs.

First Name
Last Name
Company
To select, begin typing.
Email
example@domain.com

http://go.esri.com/monitor
Value to Customers
Maximize GIS Investments

• Administrators:
  • Detect, diagnose, and resolve issues with availability, configuration, performance and usage
  • Gather actionable, quantifiable operational metrics and usage trends over time

• Managers:
  • Increase communication among GIS and IT staff and senior management
  • Reduce administration costs

• Users:
  • Improve end-user satisfaction
Standards for effective GIS monitoring

- Many excellent monitoring tools on the market
- Few provide GIS dashboards
- **System Monitor can be used as reference implementation**
ArcGIS Enterprise is often a victim of:
Overload:
- users
- services
Unstable Infrastructure:
- Network
- NAS
- VMWare
Bottlenecks:
- configuration
- maintenance
- workflows
ArcGIS Monitor
Web Application Validation

![Monitor - Web interface with a chart showing response time in seconds. The chart displays multiple response time measurements over time, with peaks and troughs indicating variations in performance.](image-url)
HAR

Monitor - Web

- Charlotte
- London
- New York
  - Application Validation
  - HAR
    - Code
    - Collection Time
    - Content Length Sum (MB)
    - Failed Percentage
    - Failed Requests
    - Total Requests
- Http
- Redlands

Failed Requests

Chart Resolution: real-time value at
Busy Time per Tr(sec)

Chart Resolution: real-time value at collection interval when query less than 12 hrs
ArcSOC Optimizer
### Publisher Total

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin Total</td>
<td>1</td>
</tr>
<tr>
<td>Author Total</td>
<td>1</td>
</tr>
<tr>
<td>Collection Time (sec)</td>
<td>1</td>
</tr>
<tr>
<td>Desktop Applications</td>
<td>1</td>
</tr>
<tr>
<td>Desktop Content</td>
<td>1</td>
</tr>
<tr>
<td>Desktop Layers</td>
<td>1</td>
</tr>
<tr>
<td>Desktop Maps</td>
<td>1</td>
</tr>
<tr>
<td>Desktop Tools</td>
<td>1</td>
</tr>
<tr>
<td>Last 24Hrs</td>
<td>1</td>
</tr>
<tr>
<td>Org</td>
<td>1</td>
</tr>
<tr>
<td>Private</td>
<td>1</td>
</tr>
<tr>
<td>Public</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note: Chart Resolution: real-time value at collection interval when query less than 1 day.*
ArcGIS Monitor
Database
Database Catalog view
Cloud (AWS)
ArcGIS Monitor
Infrastructure
System
Rping
WebGIS Health (Portal HA)
WebGIS Health Extension – What do you get to monitor?

- Know about failures before system fails
  - Portal for ArcGIS Primary or Standby site failure
  - Index health of Portal for ArcGIS
  - Portal for ArcGIS thinks both machines are primary/standby
  - Hosted ArcGIS for Server’s health
    - Publishing Services
  - Datastore is valid but the standby machine is down
  - Datastore failed over in the past five minutes
  - Datastore Service is not running
VMware

Avoid over allocation and live migration of running virtual machines during work hours
ArcGIS Monitor
Usage (tr/hr)
Usage (Tr/hr)
License (lmutil)
Williams is one of the premier natural gas infrastructure providers in North America
Williams GIS Environment

Environment Overview

- **Citrix Desktop**
  - Average 120 Citrix ArcGIS Desktop User

- **Support 63 Development, QA and Production Servers (mostly virtual)**
  - 26 Production

- **Clustered ArcGIS Server Environment**
  - 216 Services, 164 Map, 33 GP, 1 Geometry & 1 Search

- **Federated ArcGIS Portal**
  - 238 Services, 199 Map, 9 GP, 1 Search, 1 Geometry & 30 Feature
  - 1,800 User (100 Average User)
# ESRI System Monitoring Tools Used

## Environment Overview

- **System Monitor 3**
- **ExcelReports**

## Report Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Type</th>
<th>Name</th>
<th>Source</th>
<th>Time</th>
<th>Uptime</th>
<th>Performs</th>
<th>High Util</th>
<th>Low Util</th>
<th>Alerts</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Application</td>
<td>Requests</td>
<td>Response Time/sec</td>
<td>Url</td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Application</td>
<td>Requests</td>
<td>Response Time/sec</td>
<td>Url</td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Application</td>
<td>Errors</td>
<td>Count</td>
<td>Url</td>
<td>Hourly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Site</td>
<td>Configuration</td>
<td>AdminAPI</td>
<td></td>
<td>Last</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Services</td>
<td>Summary</td>
<td>AdminAPI</td>
<td></td>
<td>Last</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Requests</td>
<td>Count</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Requests</td>
<td>Requests/sec</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Services</td>
<td>Requests/sec</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Services</td>
<td>Instances</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Services</td>
<td>Response Time/sec</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS Services</td>
<td>Response Time/sec</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extensions</td>
<td>Extensions</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS License</td>
<td>Utilization(%)</td>
<td>Lmutil</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS License</td>
<td>Users</td>
<td>Lmutil</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ArcGIS License</td>
<td>User Names</td>
<td>Lmutil</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Application</td>
<td>Requests</td>
<td>Per IP</td>
<td>WebLogs</td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Application</td>
<td>Requests</td>
<td>Per Hour</td>
<td>WebLogs</td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Application</td>
<td>Requests</td>
<td>Count</td>
<td>WebLogs</td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Application</td>
<td>Requests</td>
<td>Response Time/sec</td>
<td>WebLogs</td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Summary</td>
<td>Summary</td>
<td>AdminAPI</td>
<td></td>
<td>Last</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System CPU</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System CPU</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Hourly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Memory Physical</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Memory Physical</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Hourly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Memory Virtual</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Memory Virtual</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Hourly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Disk Utilization</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Disk Utilization</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Disk Space</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Network Receive</td>
<td>mbps</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Network Receive</td>
<td>mbps</td>
<td>AdminAPI</td>
<td></td>
<td>Hourly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Network Sent</td>
<td>mbps</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Network Sent</td>
<td>mbps</td>
<td>AdminAPI</td>
<td></td>
<td>Hourly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Process CPU</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Process Memory</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Process Memory</td>
<td>Utilization(%)</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Process Count</td>
<td>Count</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Process Count</td>
<td>Active</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td>DB query</td>
<td>AdminAPI</td>
<td></td>
<td>Timespan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**ESRI System Monitoring Tools Used**

**Environment Overview**

- System Monitor 3
  - Alerts

**Failed Collections**:

Note: In general, these errors mean that the target is unavailable or security has changed and the System Monitor Collector can no longer collect information.

Please review the System Monitor Collector configuration for the following failed items:

<table>
<thead>
<tr>
<th>Message</th>
<th>Host</th>
<th>Category</th>
<th>Counter Name</th>
<th>Collector</th>
<th>Value</th>
<th>Rule</th>
<th>Validation Value</th>
<th>Last Updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMSTUTGISAP02_REST</td>
<td>url</td>
<td></td>
<td></td>
<td>WMSTUTGISLM01</td>
<td>6538626.36</td>
<td>&gt;</td>
<td>8600</td>
<td>Dec 02 2016 13:43:55</td>
</tr>
<tr>
<td>MGISP</td>
<td>db</td>
<td></td>
<td></td>
<td>WMSTUTGISLM01</td>
<td>3017531.63</td>
<td>&gt;</td>
<td>8600</td>
<td>Jan 12 2017 07:48:50</td>
</tr>
<tr>
<td>MGISP</td>
<td>db</td>
<td></td>
<td></td>
<td>WMSTUTGISLM01</td>
<td>3017531.56</td>
<td>&gt;</td>
<td>8600</td>
<td>Jan 12 2017 07:48:50</td>
</tr>
<tr>
<td>Williams Dev ArcGIS Server Site</td>
<td>arcgis</td>
<td></td>
<td></td>
<td>WMSTUTGISLM01</td>
<td>5667060.06</td>
<td>&gt;</td>
<td>8600</td>
<td>Dec 12 2016 19:16:41</td>
</tr>
<tr>
<td>WMSTUTGISIMG01</td>
<td>system</td>
<td></td>
<td></td>
<td>WMSTUTGISLM01</td>
<td>2531909.33</td>
<td>&gt;</td>
<td>860000</td>
<td>Jan 17 2017 19:09:12</td>
</tr>
<tr>
<td>System Log Parser for ArcGIS</td>
<td>task</td>
<td></td>
<td></td>
<td>WMSTUTGISLM01</td>
<td>1530028.50</td>
<td>&gt;</td>
<td>860000</td>
<td>Jan 29 2017 13:00:33</td>
</tr>
<tr>
<td>System Logs Parser for IIS</td>
<td>task</td>
<td></td>
<td></td>
<td>WMSTUTGISLM01</td>
<td>1526457.44</td>
<td>&gt;</td>
<td>352800</td>
<td>Jan 29 2017 14:00:04</td>
</tr>
</tbody>
</table>

**Alerts**: 4. Please review the following alerting items:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Counter Name</th>
<th>Value</th>
<th>Rule</th>
<th>Validation Value</th>
<th>Last Updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>TULTWGISAP03F</td>
<td>SYSTEM</td>
<td>Available Memory GB ( _Total )</td>
<td>3.81</td>
<td>&lt;</td>
<td>4</td>
<td>Feb 16 2017 05:11:56</td>
</tr>
<tr>
<td>WMSTUTGISFS01</td>
<td>SYSTEM</td>
<td>Available Memory GB ( _Total )</td>
<td>0.08</td>
<td>&lt;</td>
<td>1</td>
<td>Feb 16 2017 05:12:30</td>
</tr>
<tr>
<td>WMSTUTGISFS01</td>
<td>SYSTEM</td>
<td>Disk % Used ( H )</td>
<td>78.17</td>
<td>&gt;=</td>
<td>75</td>
<td>Feb 16 2017 05:12:30</td>
</tr>
<tr>
<td>TULTWGISAP03B</td>
<td>SYSTEM</td>
<td>Available Memory GB ( _Total )</td>
<td>3.38</td>
<td>&lt;</td>
<td>4</td>
<td>Feb 16 2017 05:12:22</td>
</tr>
</tbody>
</table>
**ESRI System Monitoring Tools Used**

**Environment Overview**

- System Monitor 3
  - Reports

![Citrix Desktop Usage Graph](image_url)

- Avg ArcGIS Users
- Peak ArcGIS Users
- Avg GIS Citrix Users
- Peak GIS Citrix Users
- SN Tickets
**ESRI System Monitoring Tools Used**

**System Monitor 3**

- System Log Parser (ArcGIS & Web)

---

### System Log Parser Analysis Report

<table>
<thead>
<tr>
<th>Report Created</th>
<th>2/13/2017 10:05:51 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis Type</td>
<td>Complete</td>
</tr>
<tr>
<td>Server Host</td>
<td>s://ulpwggsp01b.williams.com:6443/arcgis</td>
</tr>
<tr>
<td>Server Loglevel (File)</td>
<td>FINE (90)</td>
</tr>
<tr>
<td>Log Inquiry User</td>
<td>arcgis</td>
</tr>
<tr>
<td>Start Time</td>
<td>2017-02-12T00:00:00Z</td>
</tr>
<tr>
<td>End Time</td>
<td>2017-02-13T00:00:00Z</td>
</tr>
<tr>
<td>Total Services Method Items Discovered</td>
<td>20,844</td>
</tr>
<tr>
<td>Total Requested Services</td>
<td>53</td>
</tr>
<tr>
<td>Total Inquiry Time</td>
<td>22.99 seconds</td>
</tr>
<tr>
<td>Total Number of Log Inquiry Calls</td>
<td>259</td>
</tr>
<tr>
<td>Average Log Inquiry Time</td>
<td>0.09 seconds</td>
</tr>
<tr>
<td>Average Log Inquiry Size</td>
<td>11,554 Bytes</td>
</tr>
</tbody>
</table>

### Usage and Performance: ArcSoc request counts and elapsed times (sec)

<table>
<thead>
<tr>
<th>Service/Source</th>
<th>Method</th>
<th>Username</th>
<th>Count</th>
<th>Count</th>
<th>Avg</th>
<th>Min</th>
<th>Max</th>
<th>Min</th>
<th>Max</th>
<th>Stdev</th>
<th>Sum</th>
<th>Sum Pct</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROW</td>
<td>RIGHT</td>
<td>OF</td>
<td>WAY</td>
<td>MAV.MapServer</td>
<td>/export</td>
<td>TULPWGSAP03A.WILLIAMS.COM</td>
<td>WILLIAMS</td>
<td>svc_ArcGISweb</td>
<td>290</td>
<td>1.00%</td>
<td>0.546</td>
<td>0.015</td>
</tr>
</tbody>
</table>
ESRI System Monitoring Tools Used

System Designer
<table>
<thead>
<tr>
<th>ID</th>
<th>Alerts</th>
<th>Collecting Failures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>🔴 0</td>
<td>🔴 0</td>
</tr>
<tr>
<td>2</td>
<td>🔴 0</td>
<td>🔴 0</td>
</tr>
<tr>
<td>3</td>
<td>🔴 1</td>
<td>🔴 0</td>
</tr>
<tr>
<td>4</td>
<td>🔴 1</td>
<td>🔴 0</td>
</tr>
<tr>
<td>5</td>
<td>🔴 0</td>
<td>🔴 0</td>
</tr>
<tr>
<td>6</td>
<td>🔴 0</td>
<td>🔴 0</td>
</tr>
<tr>
<td>7</td>
<td>🔴 0</td>
<td>🔴 4</td>
</tr>
<tr>
<td>8</td>
<td>🔴 0</td>
<td>🔴 0</td>
</tr>
</tbody>
</table>

**ArcGIS Monitor**

https://systemmonitoring-emcs.esri.com
Please Take Our Survey on the **Esri Events App**!

**Download the Esri Events app and find your event**

**Select the session you attended**

**Scroll down to find the survey**

**Complete Answers and Select “Submit”**