Performance and Scalability:

Tuning, Testing, and Monitoring

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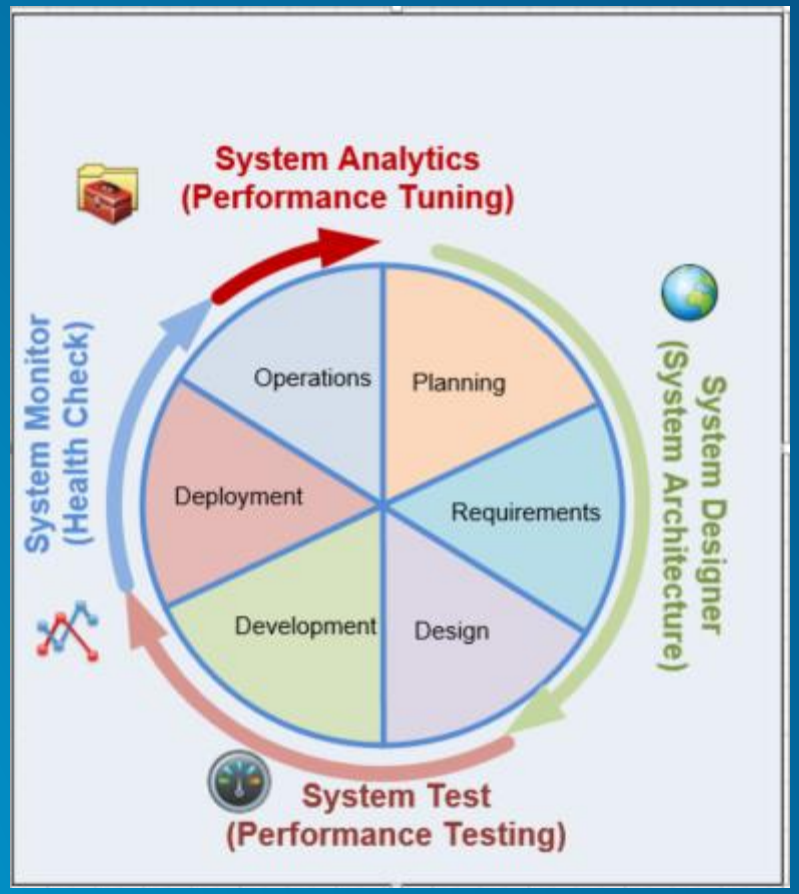
Agenda

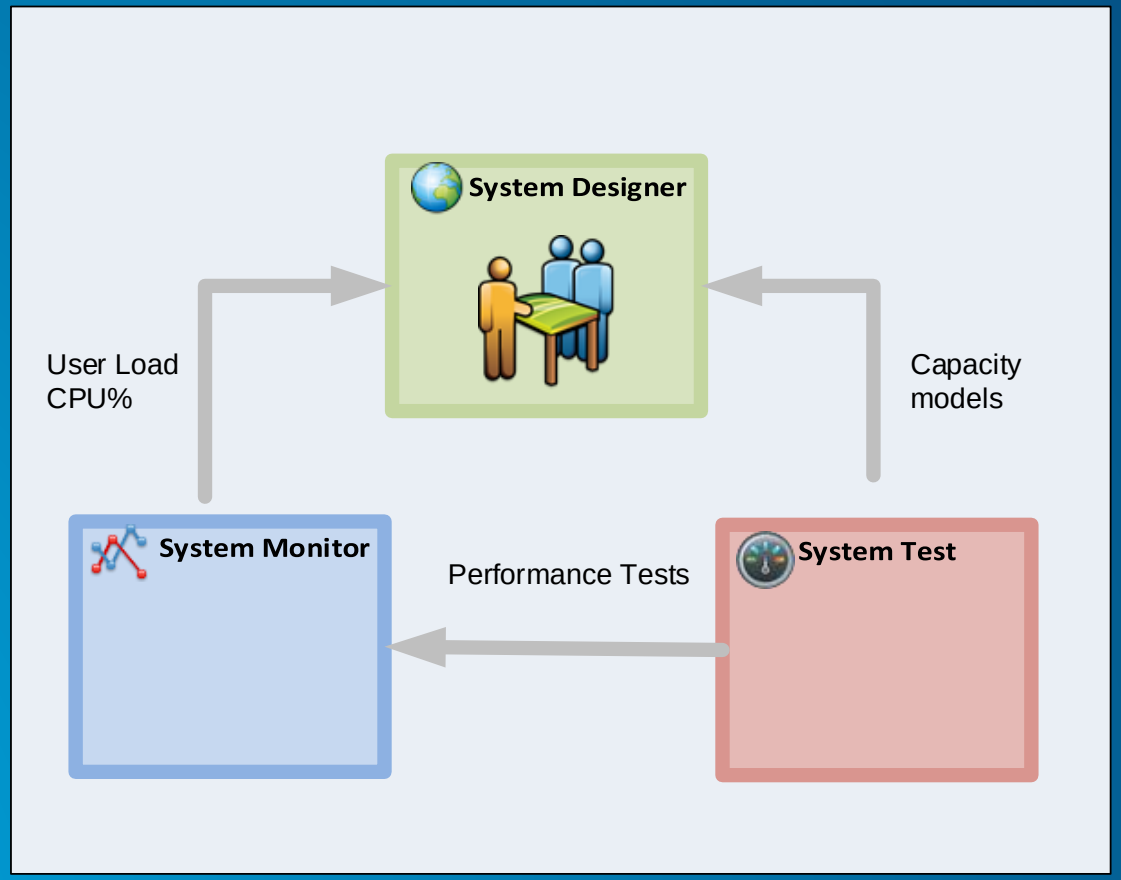
- Process, Tools, Value
- Performance tuning
- Performance testing
- Monitoring

Process, Tools, Value

Process and Tools

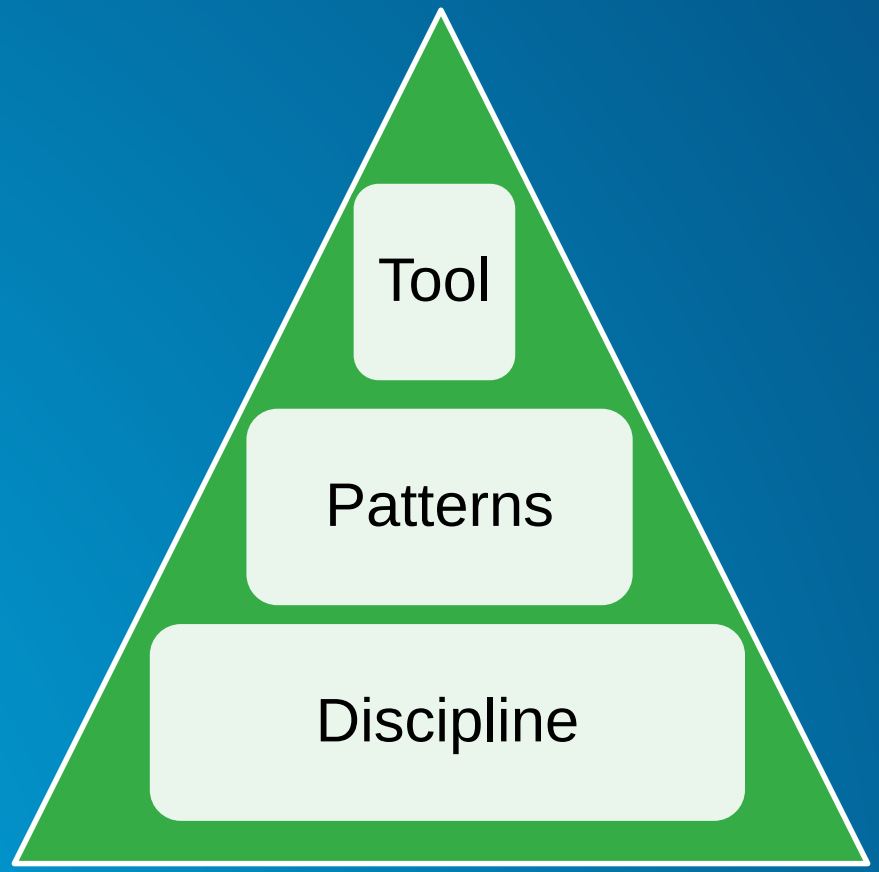


Relationship between System Tools

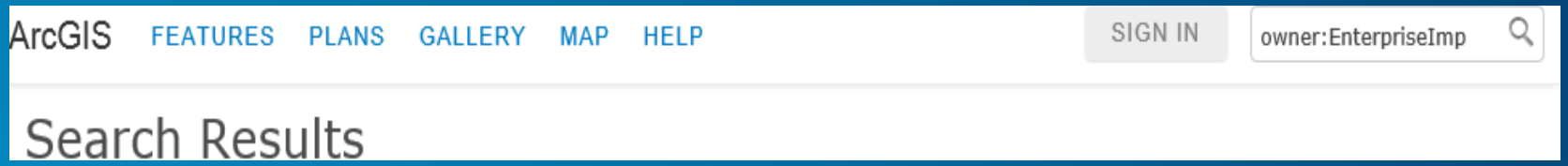


System Tools framework

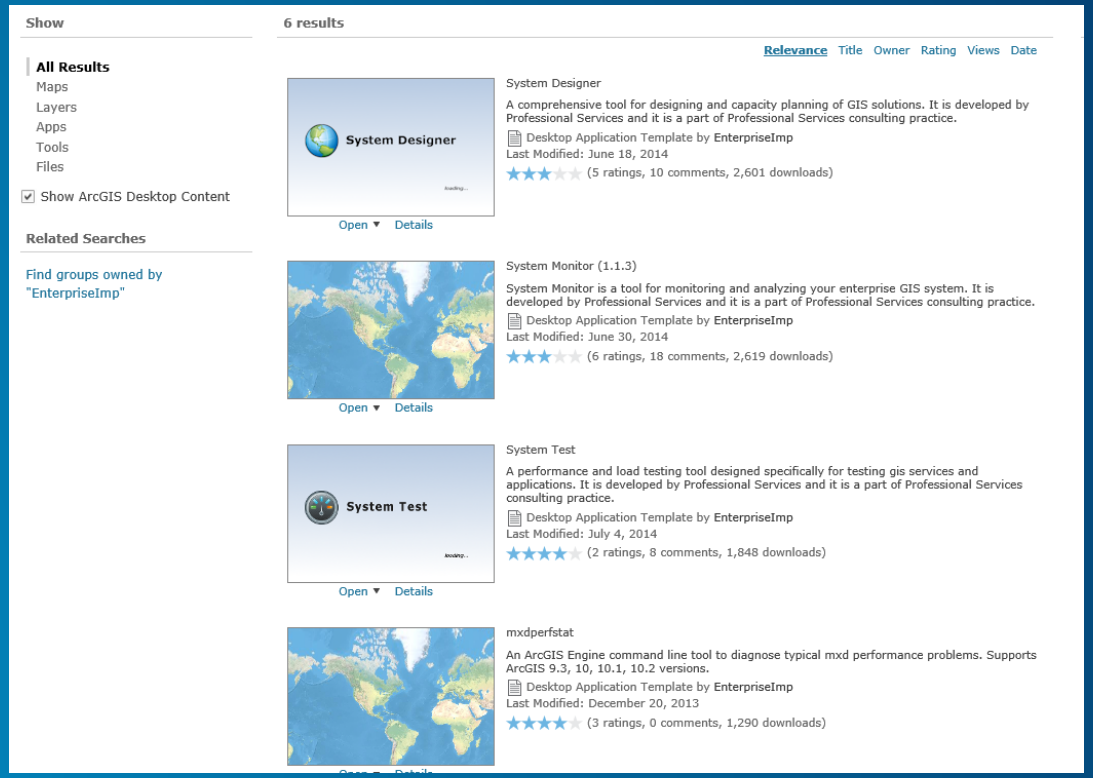
System Tools are not just tools



System Tools overview

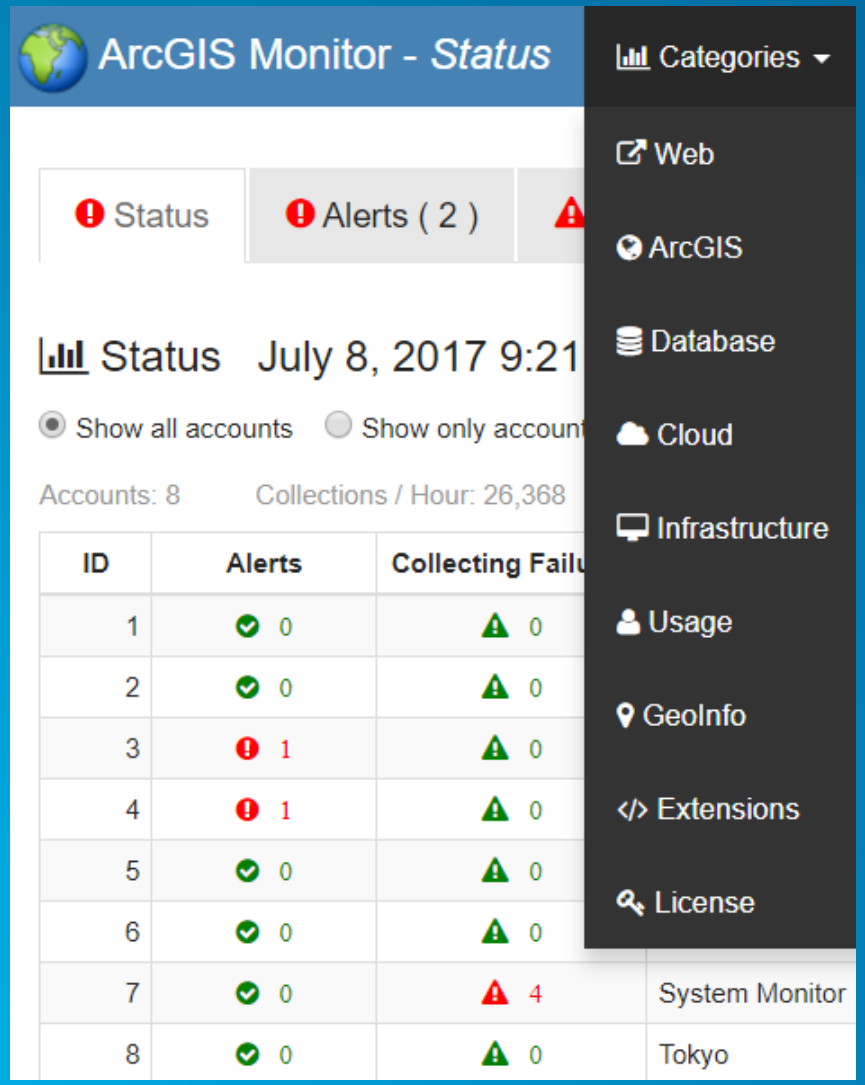


- http://www.arcgis.com
- owner:EnterpriseImp
- Show ArcGIS Desktop Content



ArcGIS Monitor

Demo: https://systemmonitoring-emcs.esri.com



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**

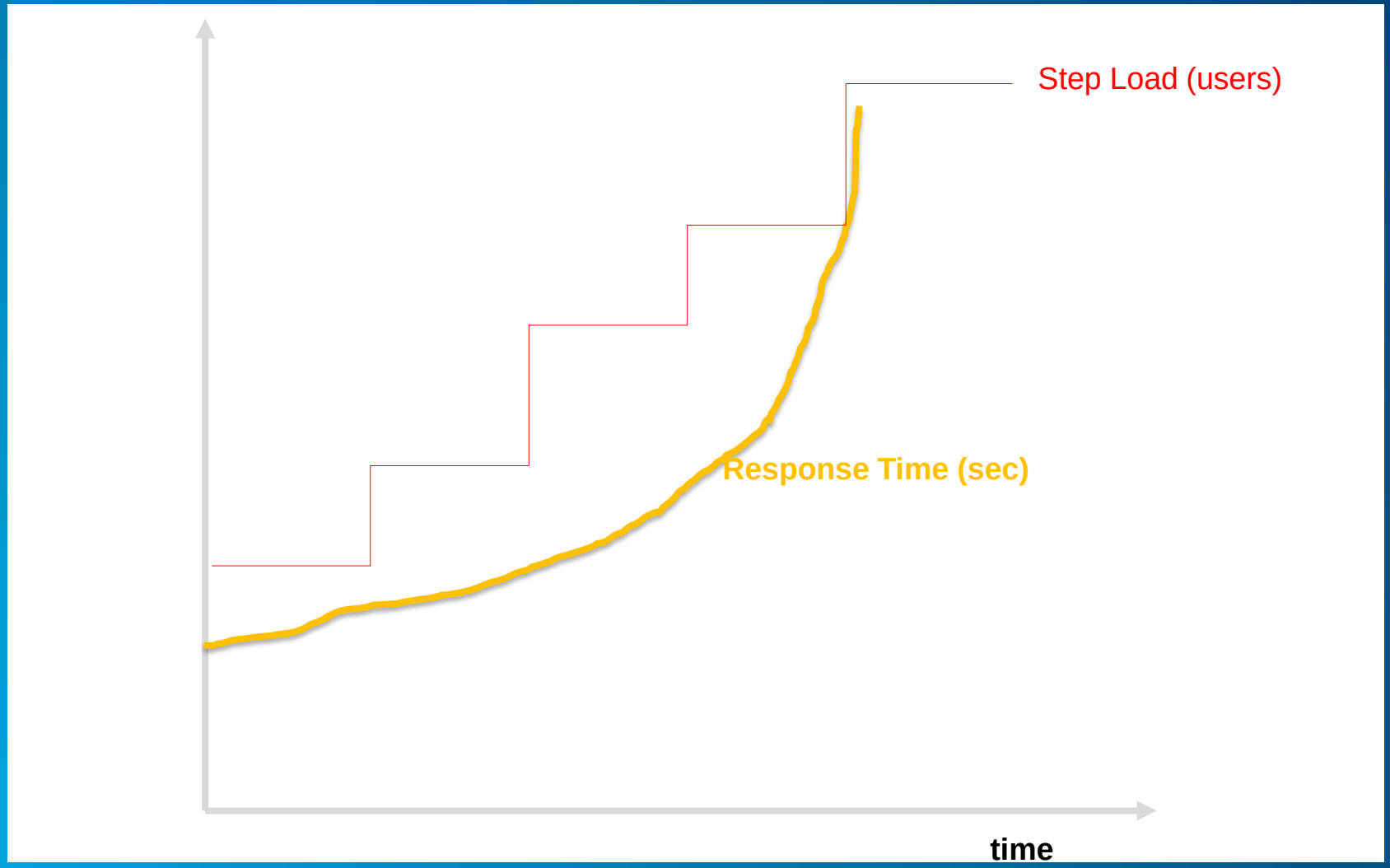
Not bottleneck

bottleneck

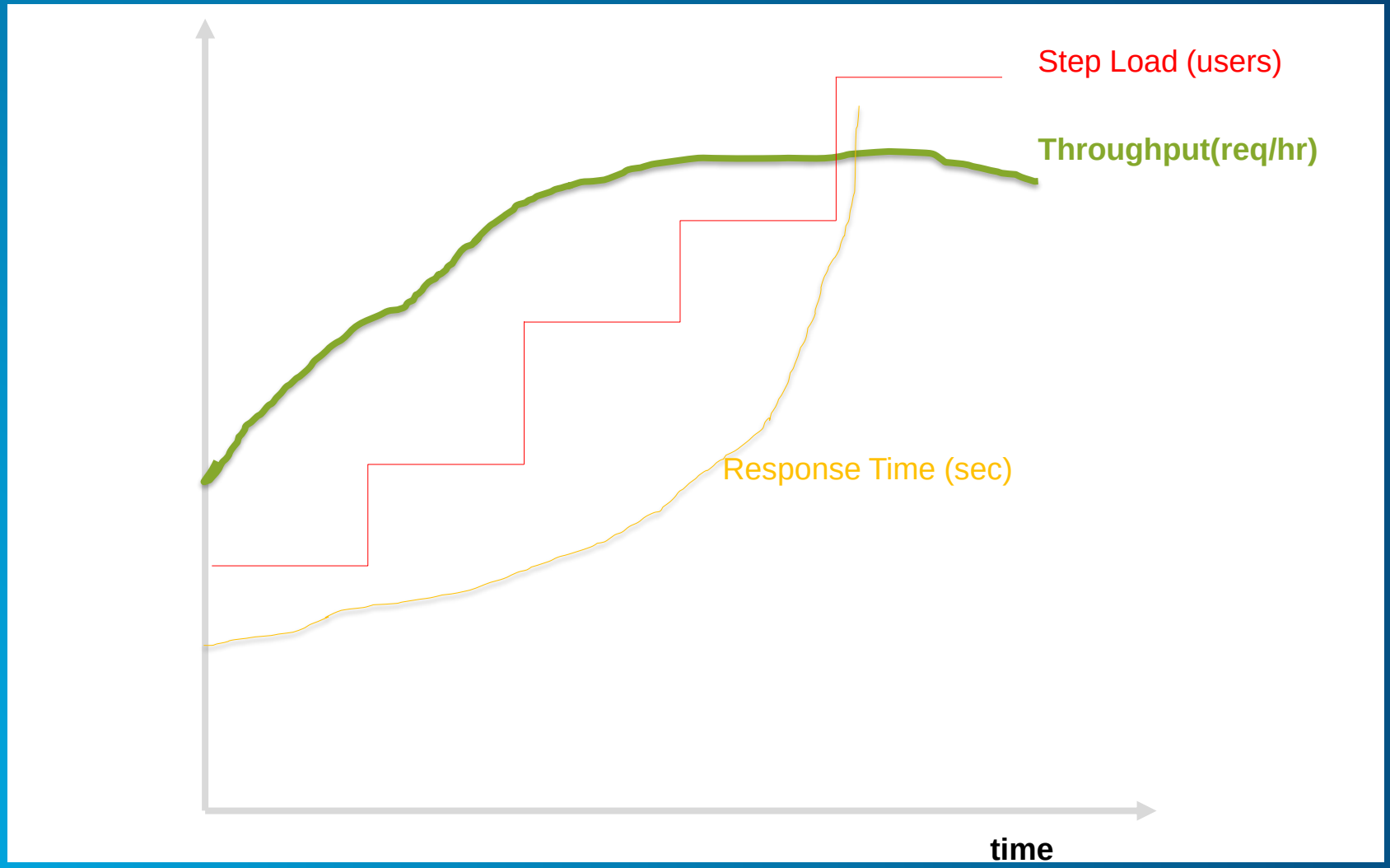
Think of :
Lanes -as CPU processor
Toll -as ArcGIS Server instances
Cars -as map requests

Test validation

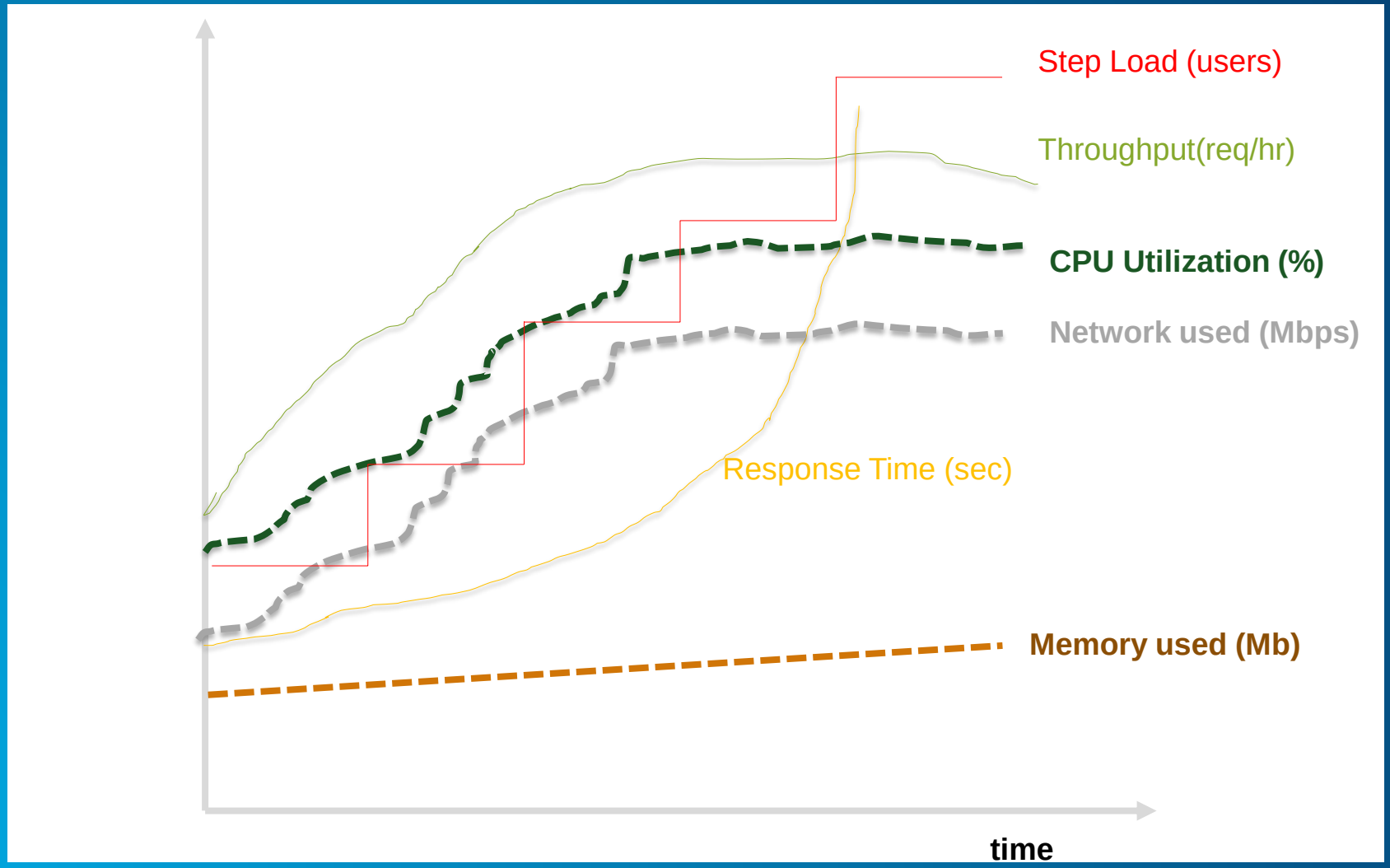
Step Load and Response Time



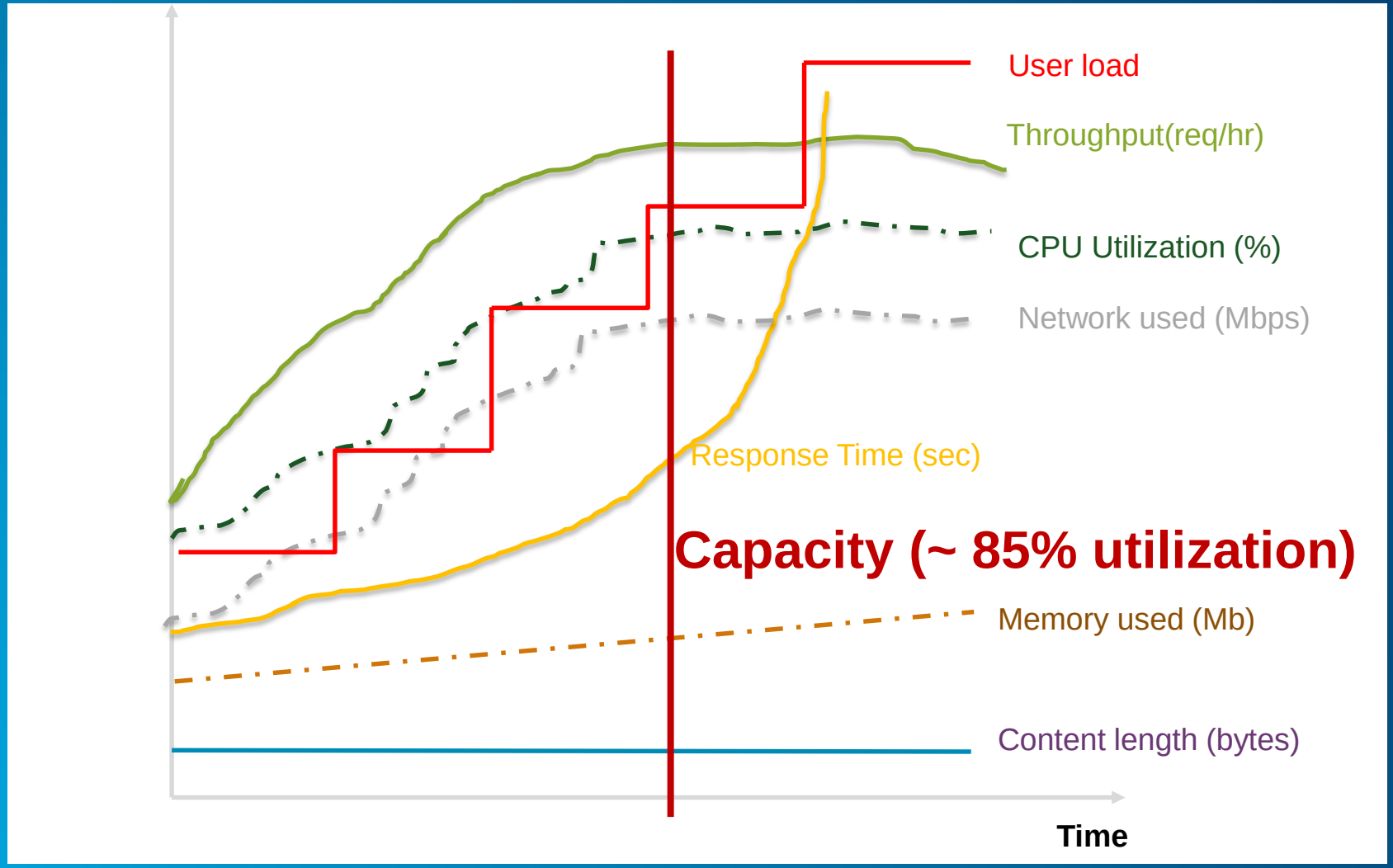
Throughput (request/hr)



Resource utilization: CPU, Memory, Network

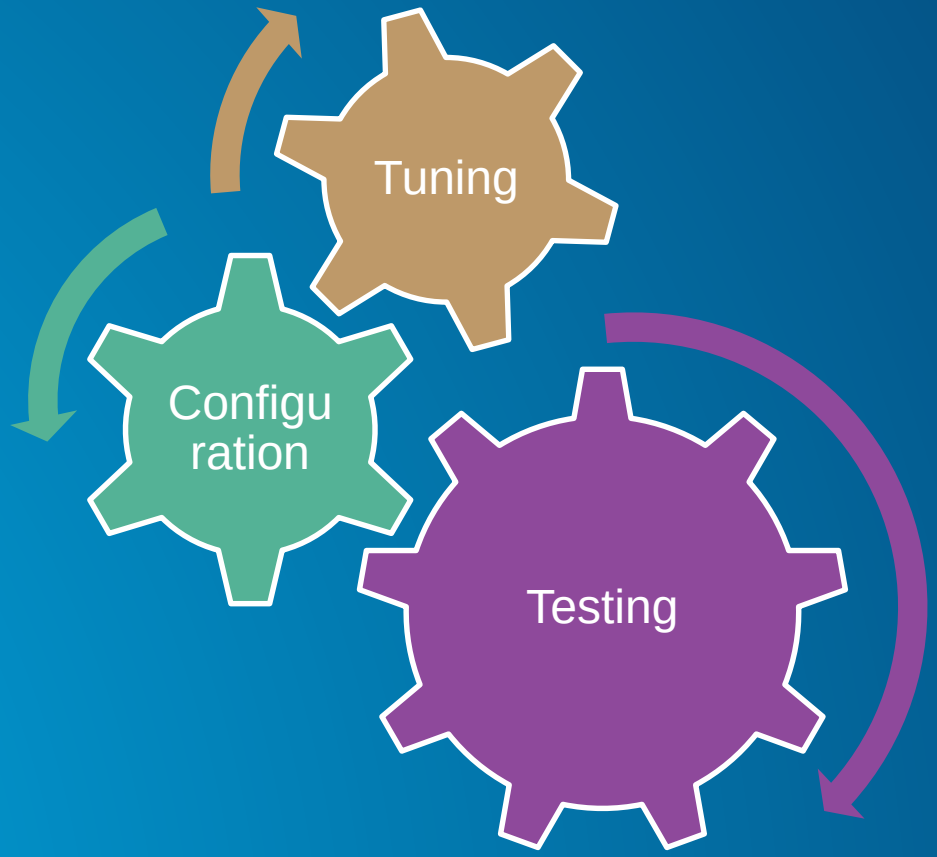


Capacity


User load
Throughput(req/hr)
CPU Utilization (%)
Network used (Mbps)
Response Time (sec)
Capacity (~ 85% utilization)
Memory used (Mb)
Content length (bytes)
Time

Required skill set

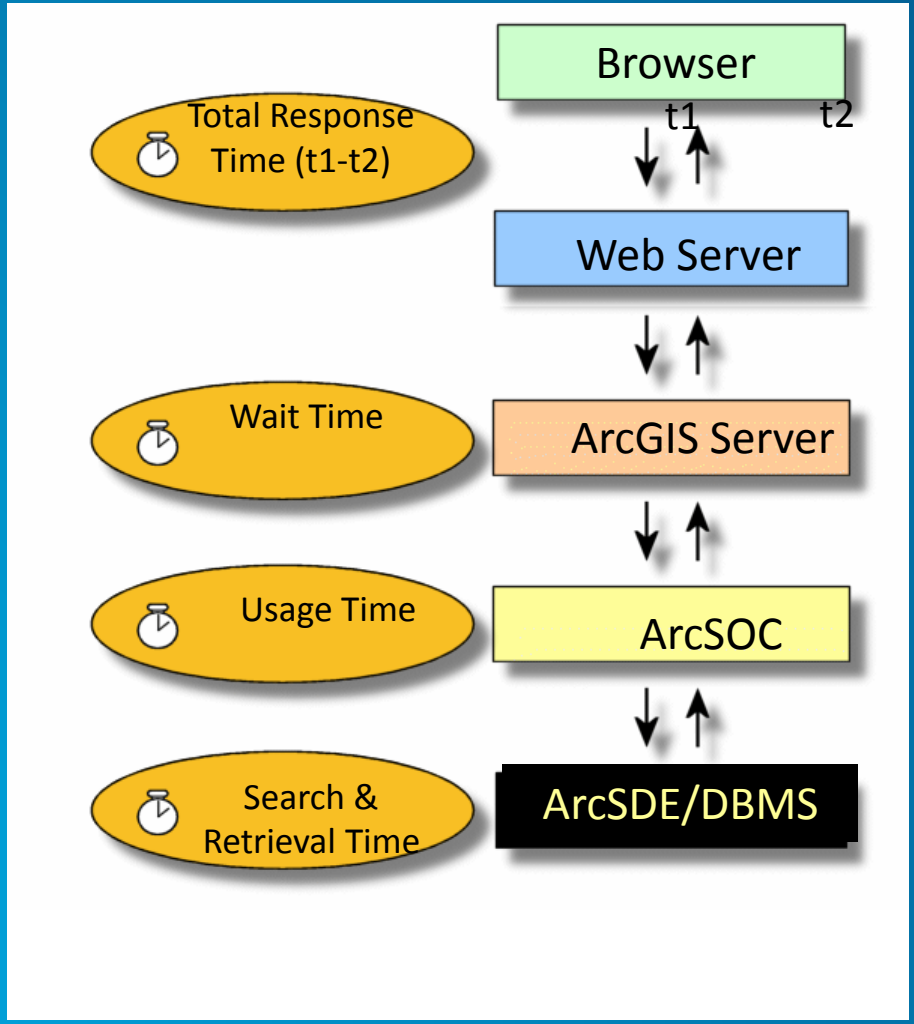
Configuration, Tuning, Testing



Tuning

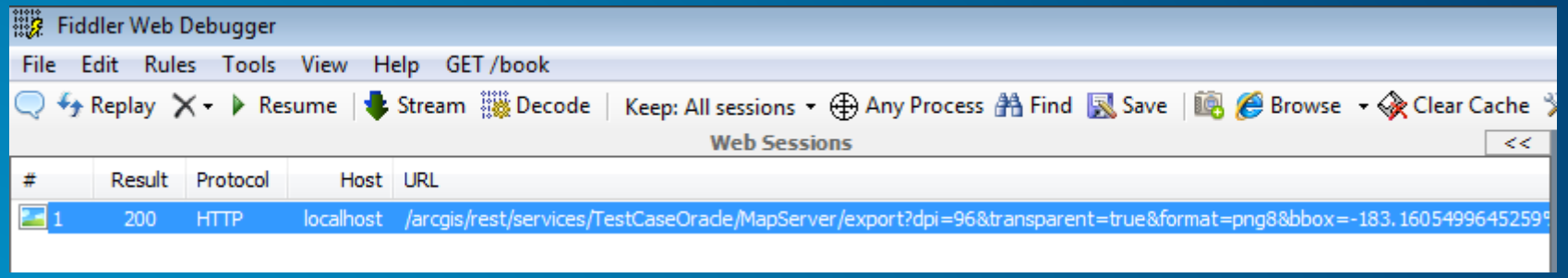
Tuning methodology

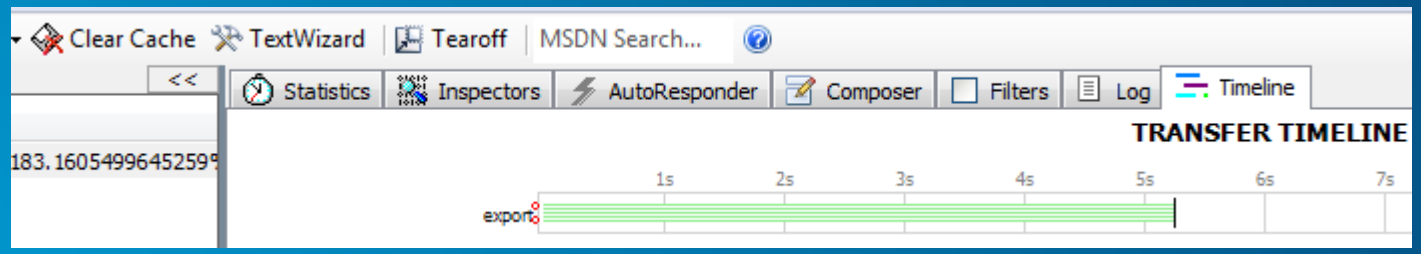
Profile each tier starting from the top



Profile application

Fiddler measurement approximately 5.2 seconds



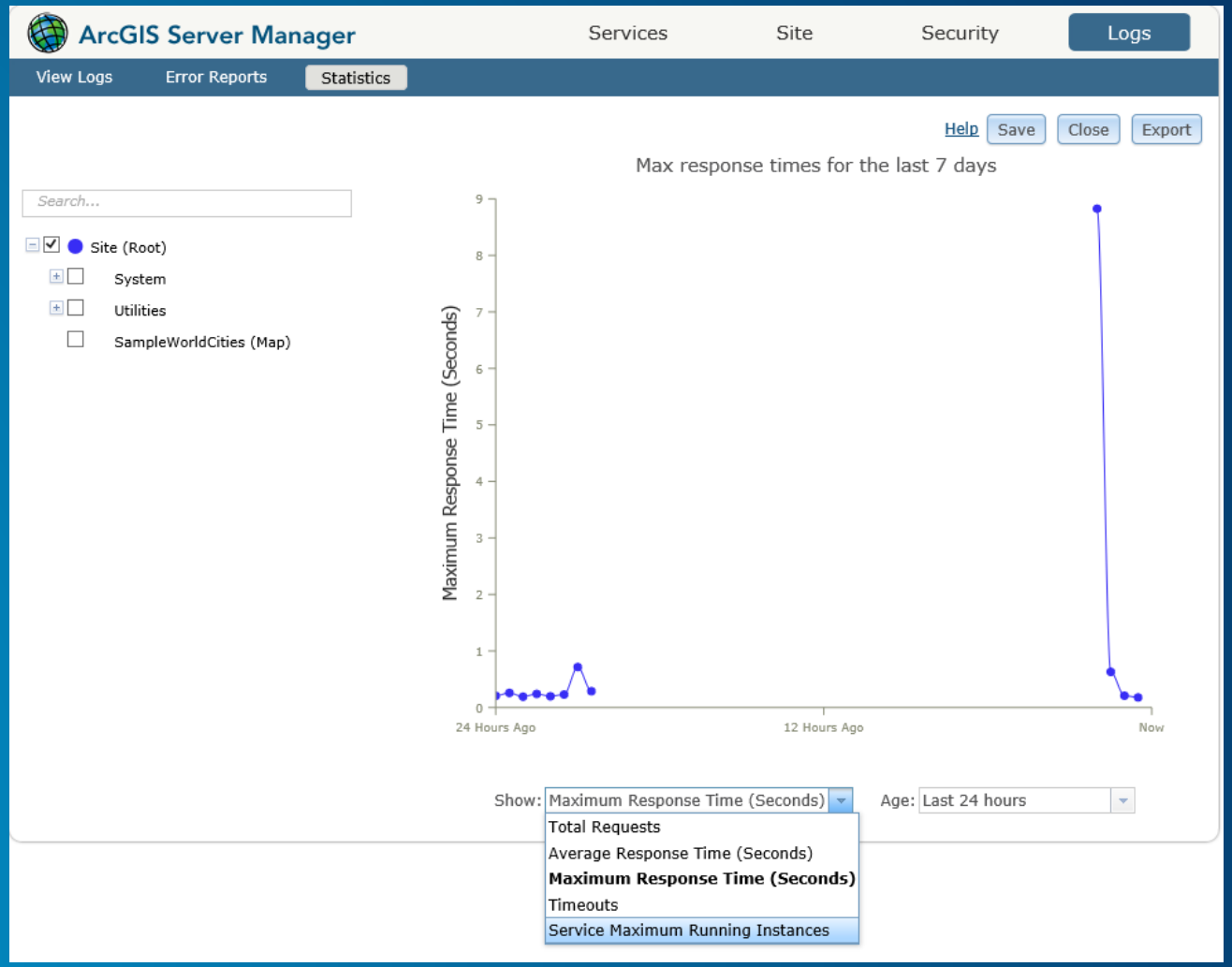


Application performance narrowed down to specific request and map service

Review historical stats of the culprit service

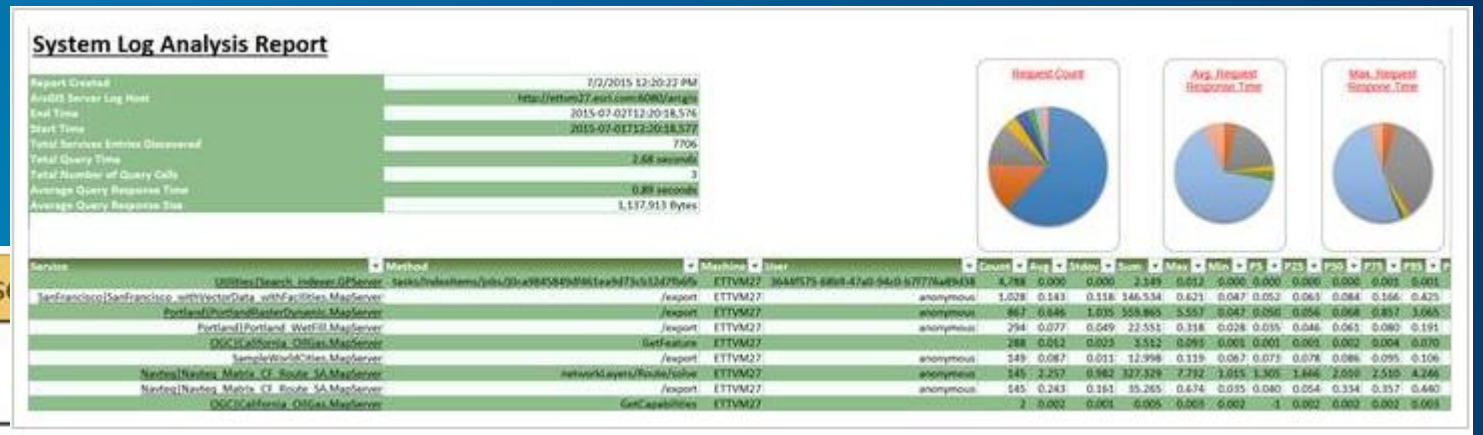
ArcGIS Server 10.3.1 Statistics

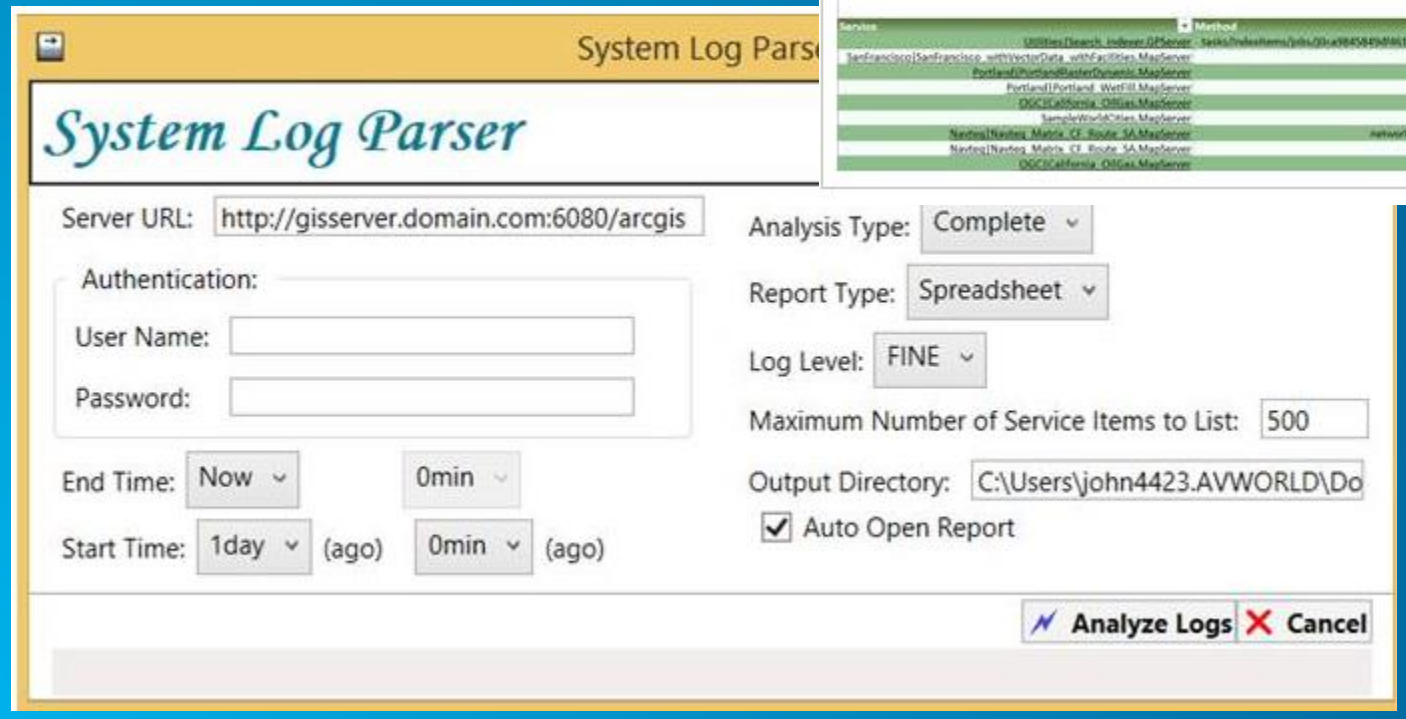
- Total requests
- Average response time
- Maximum response time
- Timeouts
- Maximum running instances
- 30 min resolution reports



Review historical stats of the culprit service

System Log Parser





Review historical stats of the culprit service

System Monitor –ArcGIS Server Statistics

ESLSRV12 (default) Jul 19, 2015 12:50:46 PM

Export to CSV

Alerting	Name	Folder	Type	Throughput (Tr/sec)	Busy Time per Tr (sec)	Transactions	Max	Busy	Free
	Summary (default)	Summary	Cluster Summary	0.117	0.285	431,564	35	0	16
	SampleWorldCities	Root	MapServer	0.100	0.245	420,875	1	0	1
	test	test1	MapServer	0.017	0.040	5,641	2	0	1
	Portland_sql_pvtdb	Root	MapServer	0.000	0.000	4,251	8	0	8
	PublishingTools	System	GPServer	0.000	0.000	746	2	0	1
	WorldCities_secured	Root	MapServer	0.000	0.000	22	2	0	1
	Geometry	Utilities	GeometryServer	0.000	0.000	22	2	0	1
	World_Map	Root	MapServer	0.000	0.000	3	2	0	1

Profile mxd of the culprit map service

Mxdperfstat

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
1	167,935,665	SDE.GridPoint	4.75	run DBMS trace: oraCPU=4.74; run DBMS trace, check oracle execution plan: oraLIO=130936; check if index exist for query def attributes;	1,998		False	4.74	.00	4.56	4.74	130,936

DBMS LIO	DBMS PIO	Source	LayerType	Layer Spatial Reference	LayerQueryDef
130,936		esriDBMS_Oracle,asakowicz,sde:oracle$asakowicz:1521/gis2,sde	esriGeometryPoint	GCS_WGS_1984	ID<1000

Oracle Trace

Compare elapsed time

```
SQL ID: 6p20xrg10fw4n Plan Hash: 569628948

SELECT  V__45.st_SHAPE$, V__45.OID,  V__45.st_points,V__45.st_numpts,
  V__45.st_entity,V__45.st_minx,V__45.st_miny,V__45.st_maxx,V__45.st_maxy,
  V__45.st_minz,V__45.st_maxz,V__45.st_minm,V__45.st_maxm,V__45.st_area$,
  V__45.st_len$,V__45.st_rowid
FROM
 (SELECT b.OID,b.GX,b.GY,b.ID,1 st_SHAPE$ ,b.SHAPE.points as st_points,
  b.SHAPE.numpts as st_numpts,b.SHAPE.entity as st_entity,b.SHAPE.minx as
  st_minx,b.SHAPE.miny as st_miny,b.SHAPE.maxx as st_maxx,b.SHAPE.maxy as
  st_maxy,b.SHAPE.minz as st_minz,b.SHAPE.maxz as st_maxz,b.SHAPE.minm as
  st_minm,b.SHAPE.maxm as st_maxm,b.SHAPE.area as st_area$,b.SHAPE.len as
  st_len$,b.rowid as st_rowid FROM SDE.GridPoint b WHERE
  SDE.ST_EnvIntersects(b.SHAPE,:1,:2,:3,:4) = 1  AND b.OID NOT IN (SELECT /*+
  HASH_AJ */ SDE_DELETES_ROW_ID FROM SDE.D45 WHERE DELETED_AT IN (SELECT
  l.lineage_id FROM SDE.state_lineages l WHERE l.lineage_name =
  :lineage_name1 AND l.lineage_id <= :state_id1) AND SDE_STATE_ID = 0) UNION
  ALL SELECT a.OID,a.GX,a.GY,a.ID,2 st_SHAPE$ ,a.SHAPE.points as st_points,
  a.SHAPE.numpts as st_numpts,a.SHAPE.entity as st_entity,a.SHAPE.minx as
  st_minx,a.SHAPE.miny as st_miny,a.SHAPE.maxx as st_maxx,a.SHAPE.maxy as
  st_maxy,a.SHAPE.minz as st_minz,a.SHAPE.maxz as st_maxz,a.SHAPE.minm as
  st_minm,a.SHAPE.maxm as st_maxm,a.SHAPE.area as st_area$,a.SHAPE.len as
  st_len$,a.rowid as st_rowid FROM SDE.A45 a,SDE.state_lineages SL WHERE
  SDE.ST_EnvIntersects(a.SHAPE,:5,:6,:7,:8) = 1  AND (a.OID, a.SDE_STATE_ID)
  NOT IN (SELECT /*+ HASH_AJ */ SDE_DELETES_ROW_ID, SDE_STATE_ID FROM SDE.D45
  WHERE DELETED_AT IN (SELECT  l.lineage_id FROM SDE.state_lineages l WHERE
  l.lineage_name = :lineage_name2 AND l.lineage_id <= :state_id2) AND
  SDE_STATE_ID > 0) AND a.SDE_STATE_ID = SL.lineage_id AND SL.lineage_name =
  :lineage_name3 AND SL.lineage_id <= :state_id3) V__45 WHERE  (ID<1000)


call     count       cpu    elapsed       disk      query    current        rows
------- ------  -------- ---------- ---------- ---------- ----------  ----------
Parse        0      0.00       0.00          0          0          0           0
Execute      1      0.03       0.02          0          0          0           0
Fetch       20      9.67       9.64          0     129581          0        1998
------- ------  -------- ---------- ---------- ---------- ----------  ----------
total       21      9.70       9.66          0     129581          0        1998
```

Elapsed time slightly changed due to different test runs

Oracle Execution plan

```
Misses in library cache during parse: 1
Misses in library cache during execute: 1
Optimizer mode: ALL_ROWS
Parsing user id: 84
Number of plan statistics captured: 1

Rows (1st) Rows (avg) Rows (max)  Row Source Operation
---------- ---------- ----------  ---------------------------------------------------
      1998       1998       1998  VIEW  (cr=131605 pr=0 pw=0 time=512477 us cost=8 size=45906 card=21)
      1998       1998       1998   UNION-ALL  (cr=131605 pr=0 pw=0 time=511602 us)
      1998       1998       1998    FILTER  (cr=131451 pr=0 pw=0 time=508349 us)
      1998       1998       1998     TABLE ACCESS BY INDEX ROWID GRIDPOINT (cr=131451 pr=0 pw=0 time=4
    129600     129600     129600      DOMAIN INDEX (Sel: Default - Undefined) A29_IX1 (cr=2017 pr=0 pw
         0          0          0     NESTED LOOPS  (cr=0 pr=0 pw=0 time=4456 us cost=0 size=44 card=1)
         0          0          0      INDEX RANGE SCAN D45_PK (cr=0 pr=0 pw=0 time=2101 us cost=0 size
         0          0          0      INDEX UNIQUE SCAN LINEAGES_PK (cr=0 pr=0 pw=0 time=0 us cost=0 s
         0          0          0    NESTED LOOPS ANTI (cr=154 pr=0 pw=0 time=2247 us cost=5 size=2367
         0          0          0     NESTED LOOPS  (cr=154 pr=0 pw=0 time=2243 us cost=5 size=2367 car
         0          0          0      TABLE ACCESS BY INDEX ROWID A45 (cr=154 pr=0 pw=0 time=2242 us c
         0          0          0       BITMAP CONVERSION TO ROWIDS (cr=154 pr=0 pw=0 time=2236 us)
         0          0          0        BITMAP AND  (cr=154 pr=0 pw=0 time=2232 us)
         0          0          0         BITMAP CONVERSION FROM ROWIDS (cr=147 pr=0 pw=0 time=455 us)
         0          0          0          SORT ORDER BY (cr=147 pr=0 pw=0 time=454 us)
         0          0          0           INDEX RANGE SCAN A45_STATEID_IX1 (cr=147 pr=0 pw=0 time=439
         0          0          0         BITMAP CONVERSION FROM ROWIDS (cr=7 pr=0 pw=0 time=1768 us)
         0          0          0          SORT ORDER BY (cr=7 pr=0 pw=0 time=1768 us)
         0          0          0           DOMAIN INDEX (Sel: Default - Undefined) A29_IX1_A (cr=7 pr=
         0          0          0      INDEX UNIQUE SCAN LINEAGES_PK (cr=0 pr=0 pw=0 time=0 us cost=0 s
         0          0          0     VIEW PUSHED PREDICATE  VW_NSO_1 (cr=0 pr=0 pw=0 time=0 us cost=0
         0          0          0      FILTER  (cr=0 pr=0 pw=0 time=0 us)
         0          0          0       NESTED LOOPS  (cr=0 pr=0 pw=0 time=0 us cost=0 size=44 card=1)
         0          0          0        INDEX RANGE SCAN D45_PK (cr=0 pr=0 pw=0 time=0 us cost=0 size=
         0          0          0        INDEX UNIQUE SCAN LINEAGES_PK (cr=0 pr=0 pw=0 time=0 us cost=0
```

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
esriDecimalDegrees
X= .00 Y= -44.67 width= 1200 height= 1000

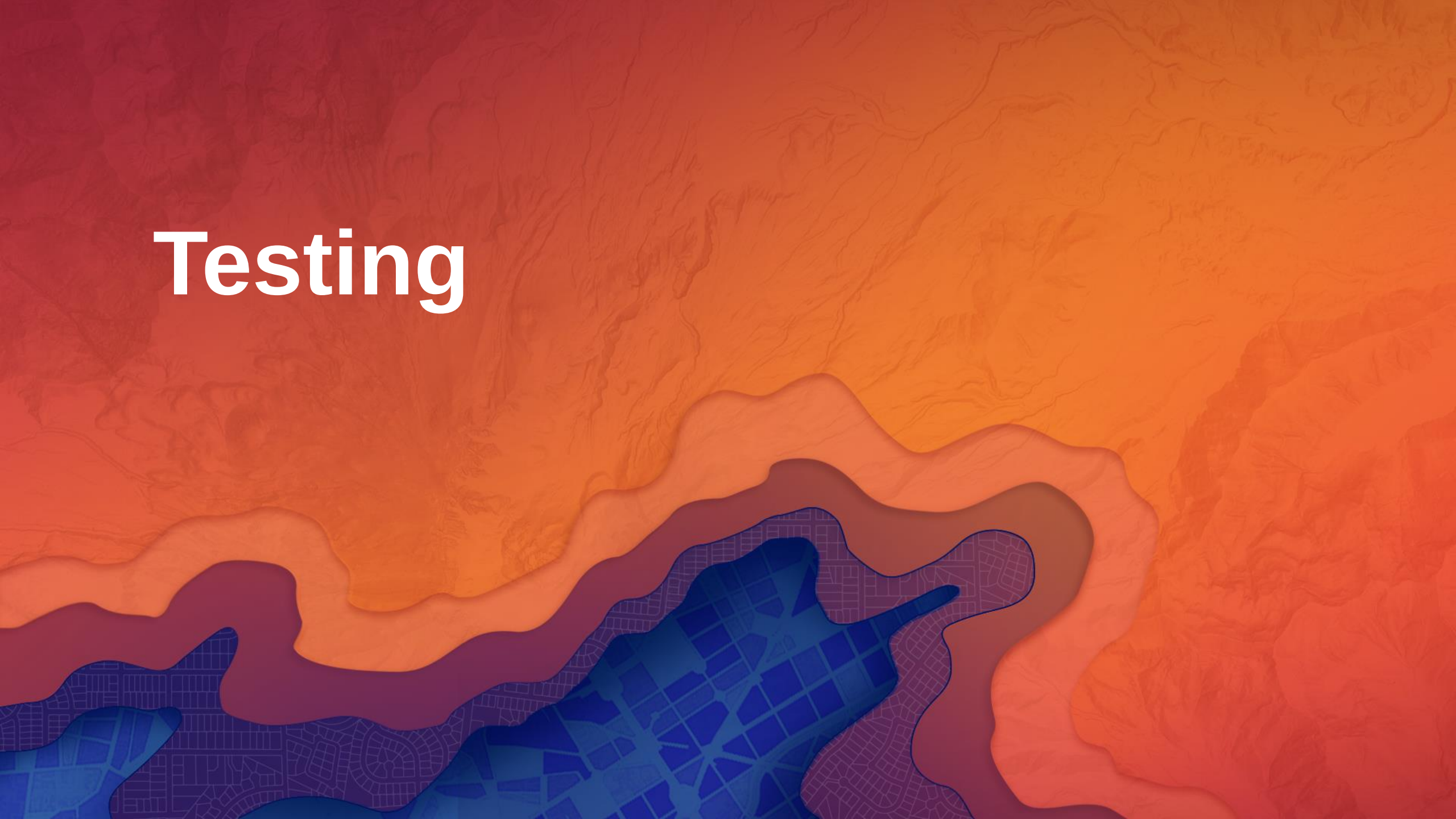
Map Display Performance (sec) for each scale

Scale	Refresh Time(sec)	VisibleLayers
100,000,000	38.64	2

Item	At Scale	Layer Name	Refresh Time (sec)	Recommendations	Features	Vertices	Labeling	Geography Phase (sec)
1	100,000,000	SDE.cities	.05		2,274		True	.04
2	100,000,000	SDE.country	38.20	simplify geometry: vertices fetched=7079678;	543	7,079,678	False	38.19

```
C:\Users\andr3665\Documents\ArcGIS>mxdperfstat10.4.exe -mxd WorldSQLExpress.mxd -scale 100000000
Unable to bind to ProductCode.Engine
7/9/2016 4:04:47 PM TestParams.SetParams check argsValid
7/9/2016 4:04:47 PM TestParams.SetParams ValidateMxd Start
7/9/2016 4:04:48 PM TestParams.SetParams ValidateMxd Finish
7/9/2016 4:04:48 PM new MainForm()
7/9/2016 4:04:48 PM InitializeComponent()
7/9/2016 4:04:49 PM InitializeComponent() Completed
7/9/2016 4:04:49 PM testParams.MxdDocumentPath
7/9/2016 4:04:49 PM mainForm.TestParams = testParams;
7/9/2016 4:04:49 PM Application.Run(mainForm)
7/9/2016 4:04:49 PM(IMapControl3)axMapControl1.Object
7/9/2016 4:04:49 PMaxMapControl1.LoadMxFile(m_mapDocumentName)
WorldSQLExpress.mxd
7/9/2016 4:05:38 PM MainForm: RunTest(ref m_activeView)
Starting test
7/9/2016 4:05:38 PMMainForm: RunTest() Started
GetVisibleLayers Scale=100000000
Name=SDE.cities MinimumScale=0, MaximumScale=0, Valid=True, Visible=True
ADDED Layer=SDE.cities
Name=SDE.country MinimumScale=0, MaximumScale=0, Valid=True, Visible=True
ADDED Layer=SDE.country
7/9/2016 4:06:55 PM Testing scale=100000000
        layer= 1 SDE.cities
7/9/2016 4:06:55 PMCursor features: layer=SDE.cities features=2274
       layer=SDE.cities Vertices=0 Features=0
       LayerVertices=0
        layer= 2 SDE.country
7/9/2016 4:08:16 PMCursor features: layer=SDE.country features=543
       layer=SDE.country Vertices=7079678 Features=543
       LayerVertices=7079678
7/9/2016 4:09:37 PM RunTest:LoadXML
7/9/2016 4:09:37 PM RunTest: ESRI.ArcGIS.ADF.COMSupport.AOUninitialize.Shutdown()
7/9/2016 4:09:37 PM RunTest: ESRI.ArcGIS.ADF.COMSupport.AOUninitialize.Shutdown() Completed
7/9/2016 4:09:37 PM RunTest:Application.Exit()
7/9/2016 4:09:37 PM After RunTest:Application.Exit()
```

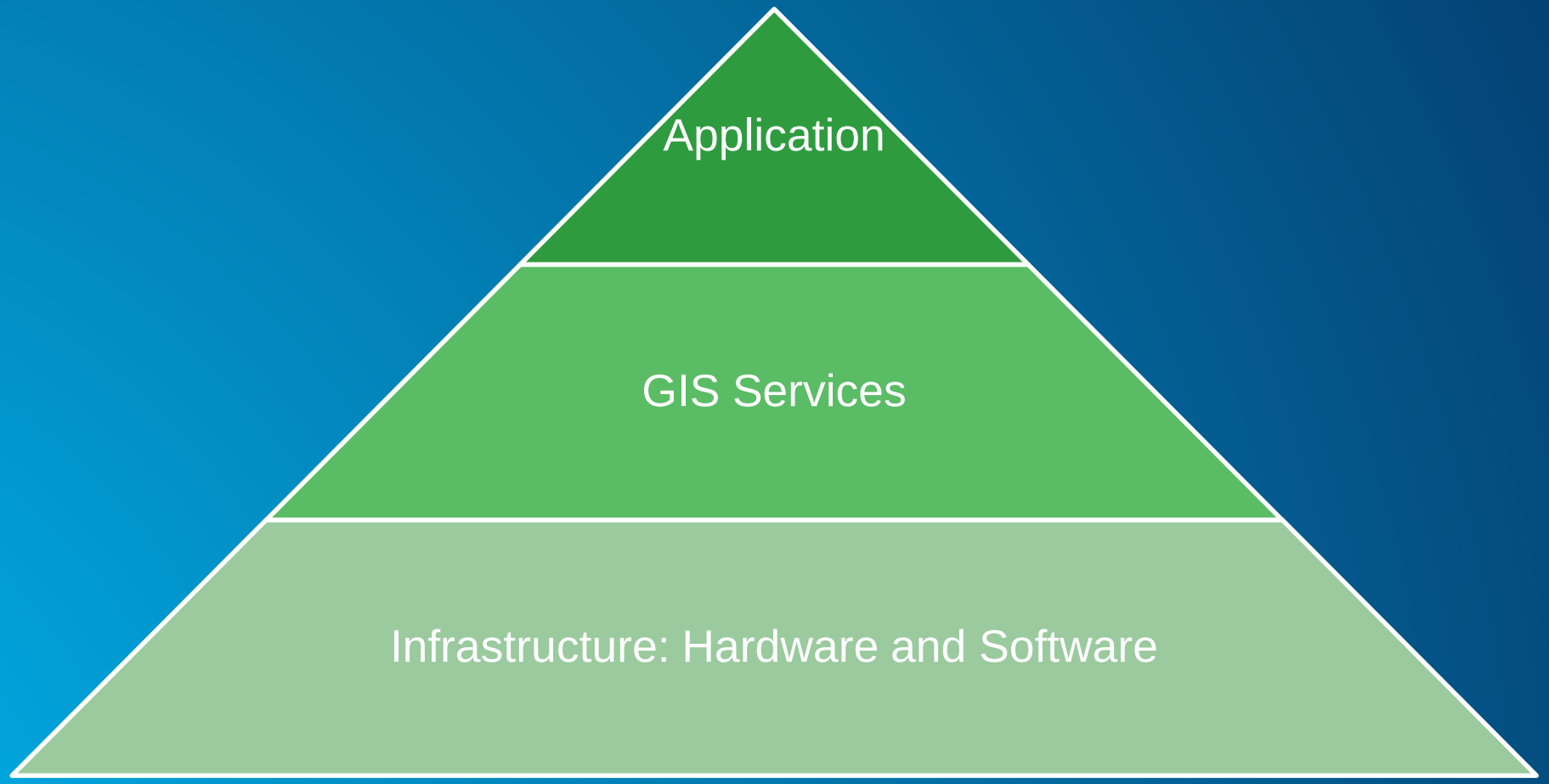
Testing



Testing Objectives

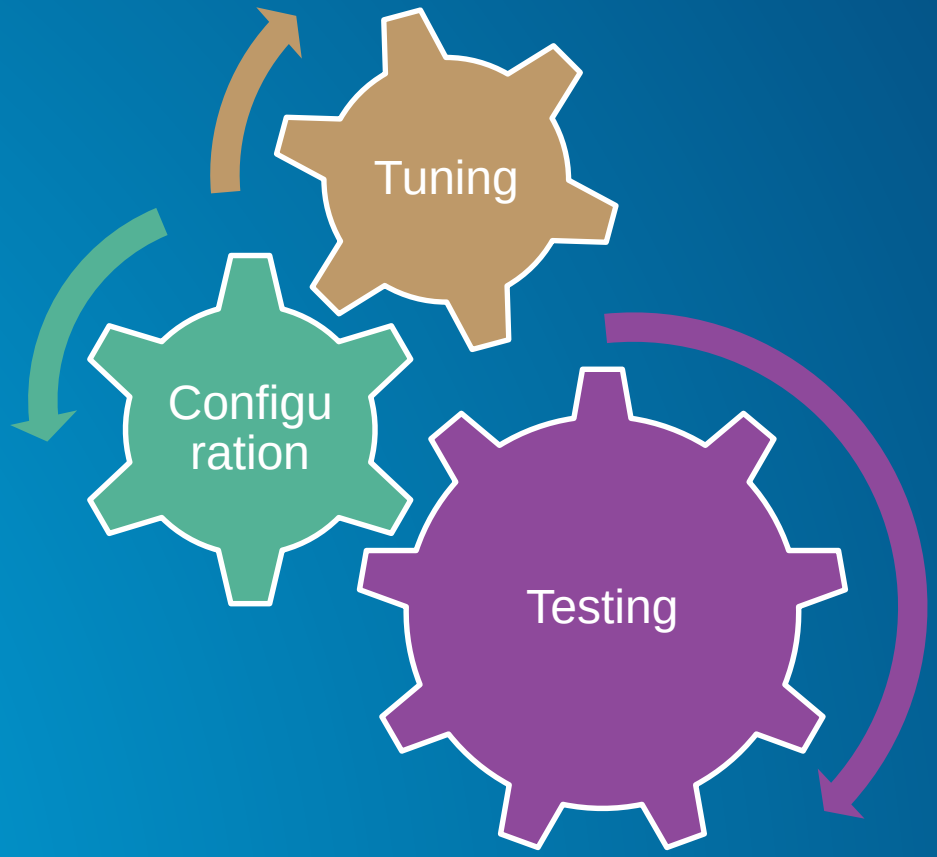
- Meet Service-Level Agreement (SLA)
- Bottlenecks analysis
- Capacity planning
- Benchmarking different alternatives

Testing process



Required skill set

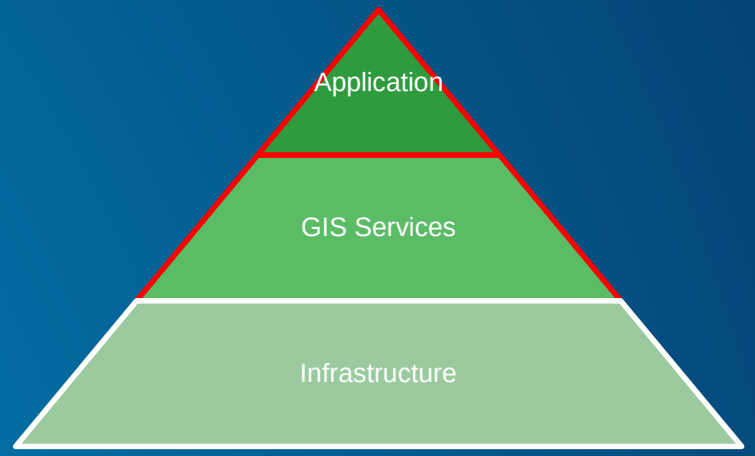
Configuration, Tuning, Testing



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**

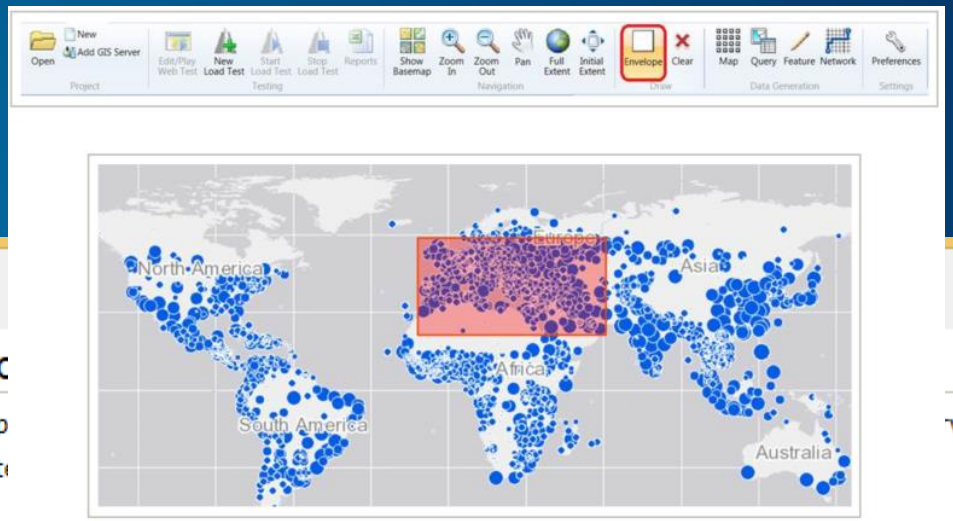


Web test tools feature comparison

Tool	Cost	Learning Curve	OS Metrics	GIS Data Generation	GIS Test Automation
Load Runner	High	High	Windows/Linux	No	No
Visual Studio	Medium	High	Windows	No	No
JMeter	Free	High	Requires additional plugin	No	No
System Test	Free	Low	Windows/Linux	Yes	Yes

Tech Support by Esri PS as part of consulting support

Demo: Dynamic Map Service



Hide Back Print Options

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    - WCS
    - WMS
    - Geocoding
    - Image Services
    - Network Analyst
    - Geoprocessing
    - Tile Cache
    - Rerun a Previous Load Test
  - Testing Application
  - Validate Results
  - Application Concepts and Compone
  - Technical Concepts
  - Command Line Tool
- Glossary

Dynamic Map Services Benchmark: Perfo

A load test is defined by a given map service and during this typ

1. Learn how to add ArcGIS Server services and a data to t
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 identif
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

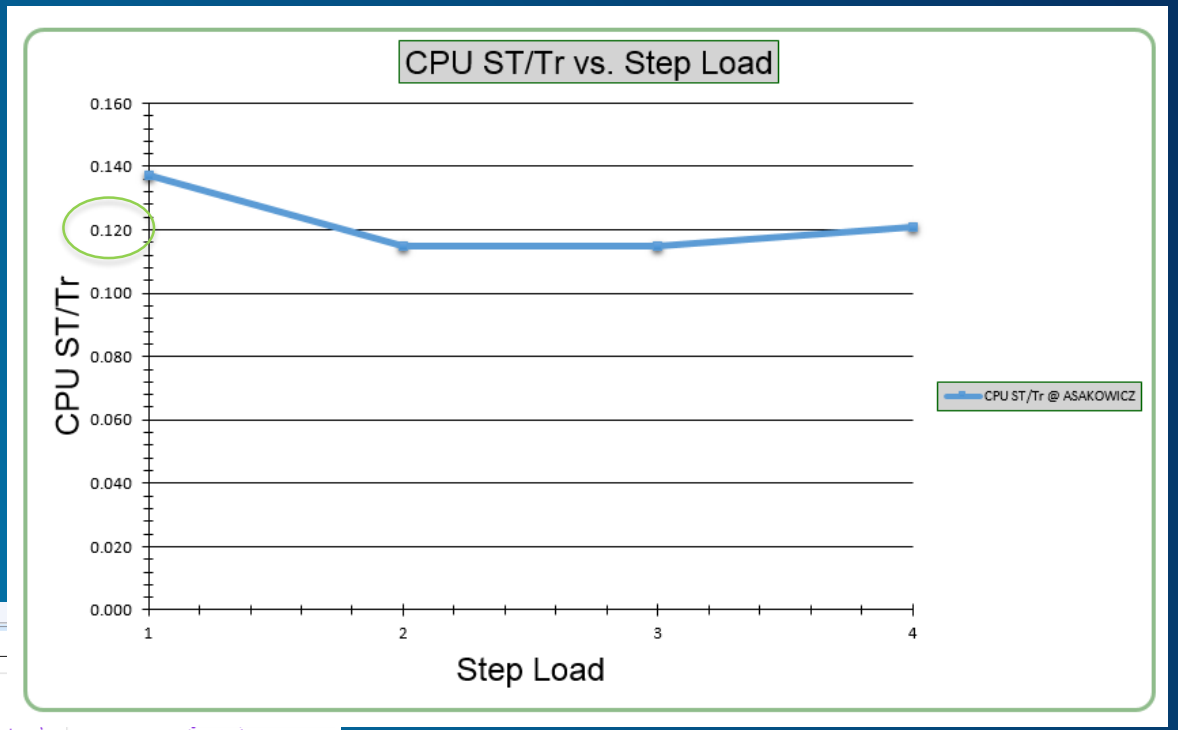
Scenario

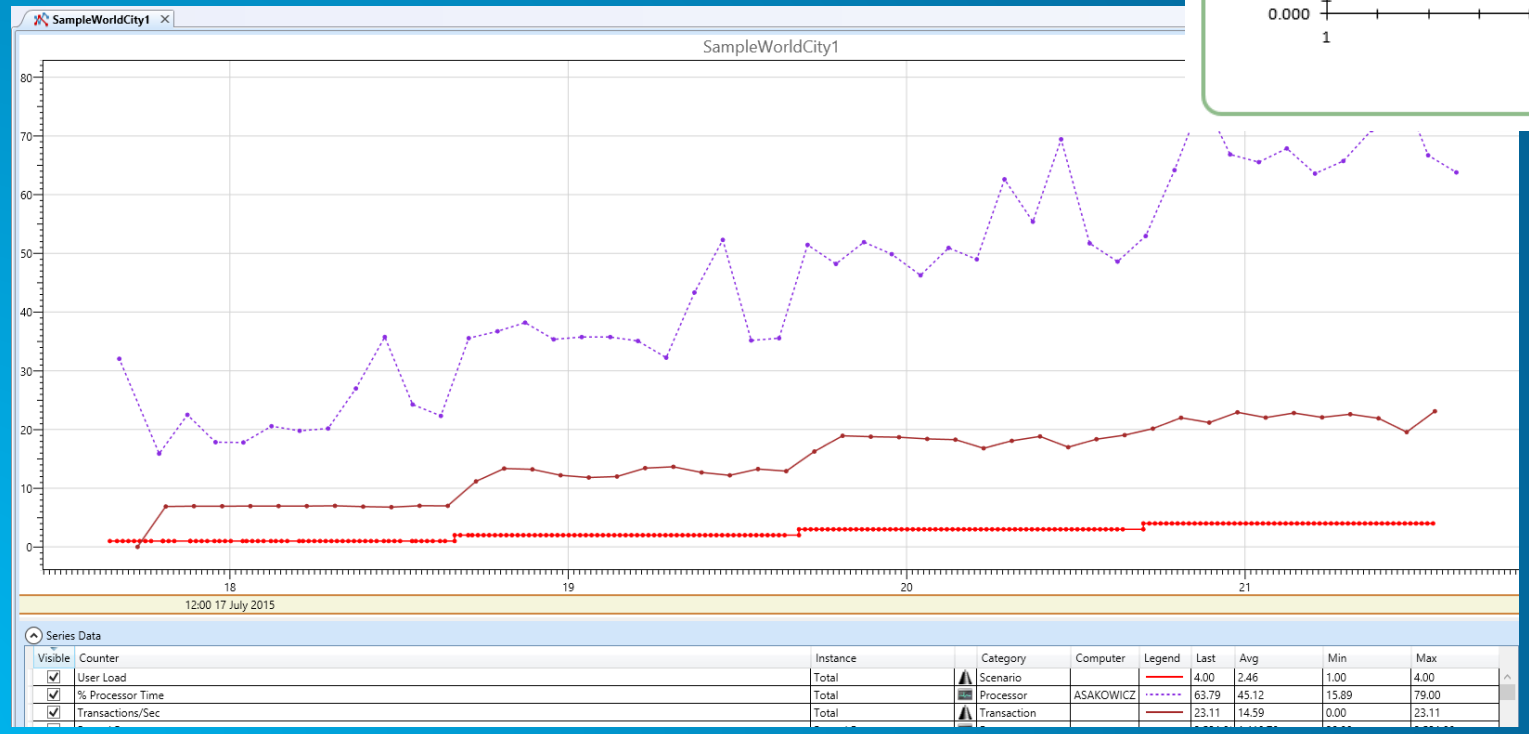
Your supervisor is planning to publish a world map that allows users to view cities. They would like to know what performance metrics to expec

High Level Steps:

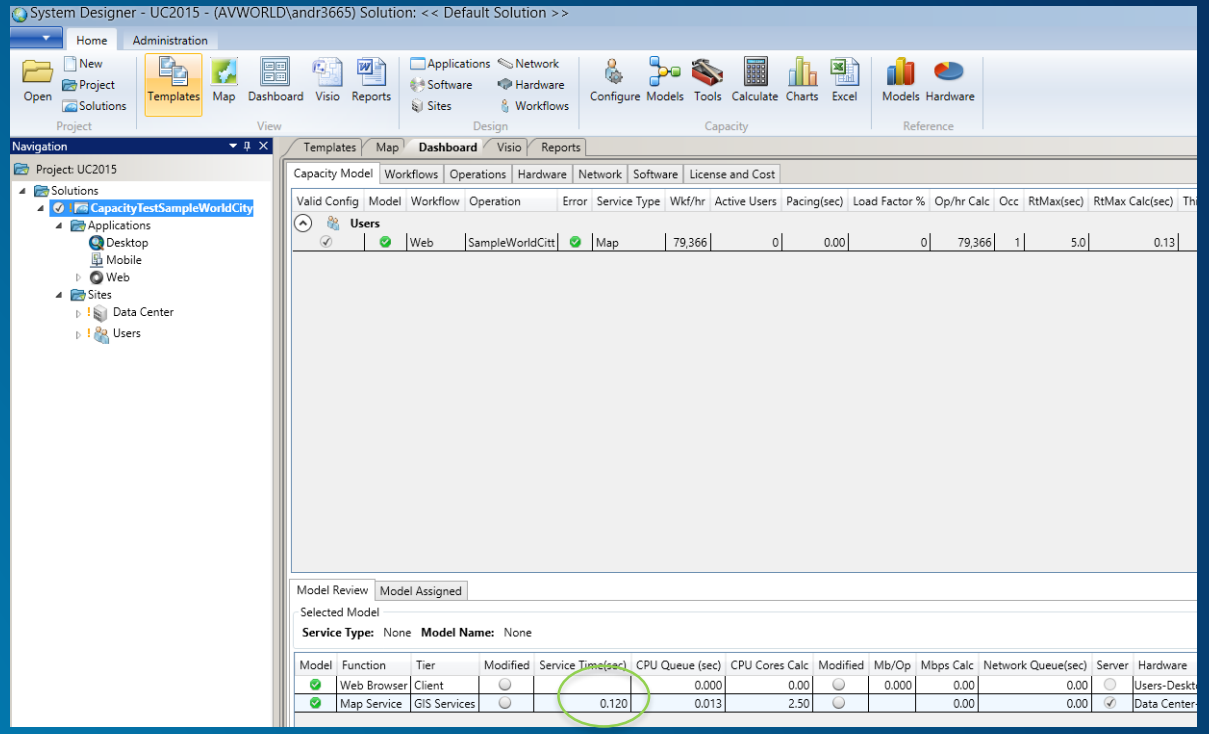
1. Create a project.
2. Add ArcGIS Server services.
3. Create test data.
4. Create web test.
5. Start load test.
6. Validate results.

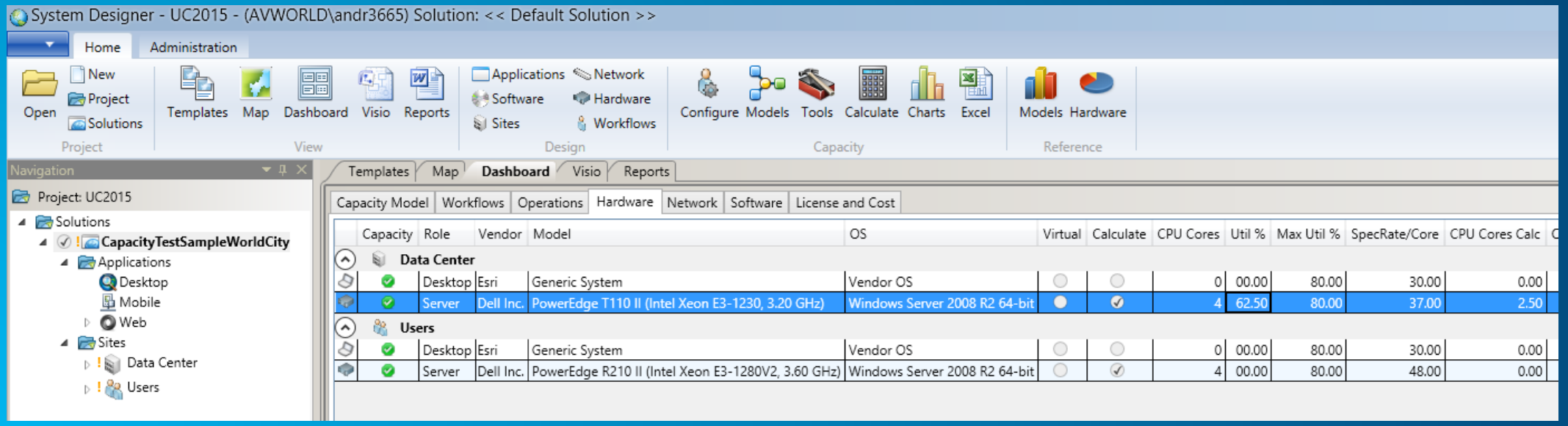
System Test output





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

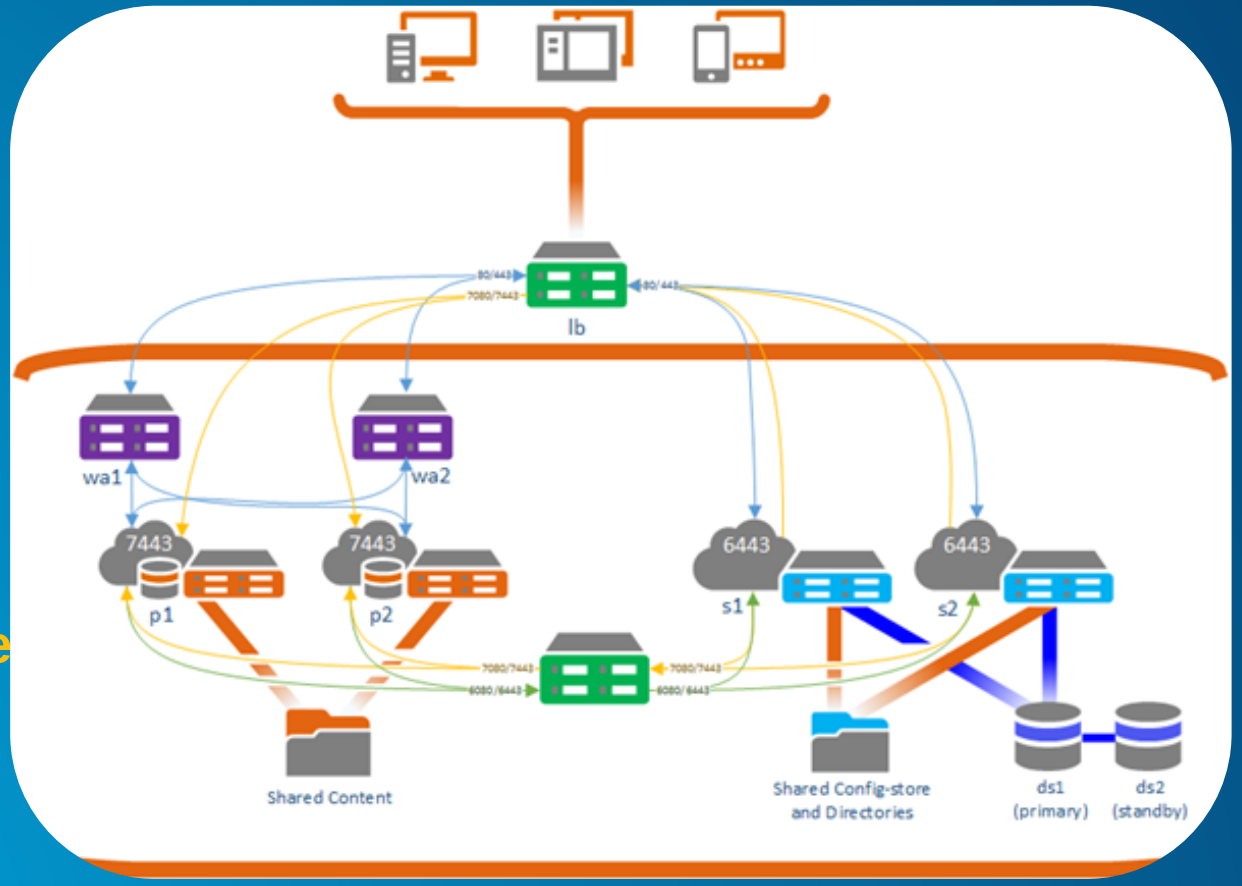
Load balancer

Firewall

ArcGIS Web Adaptor

Portal for ArcGIS

Storage with immediate consistency



ArcGIS Server

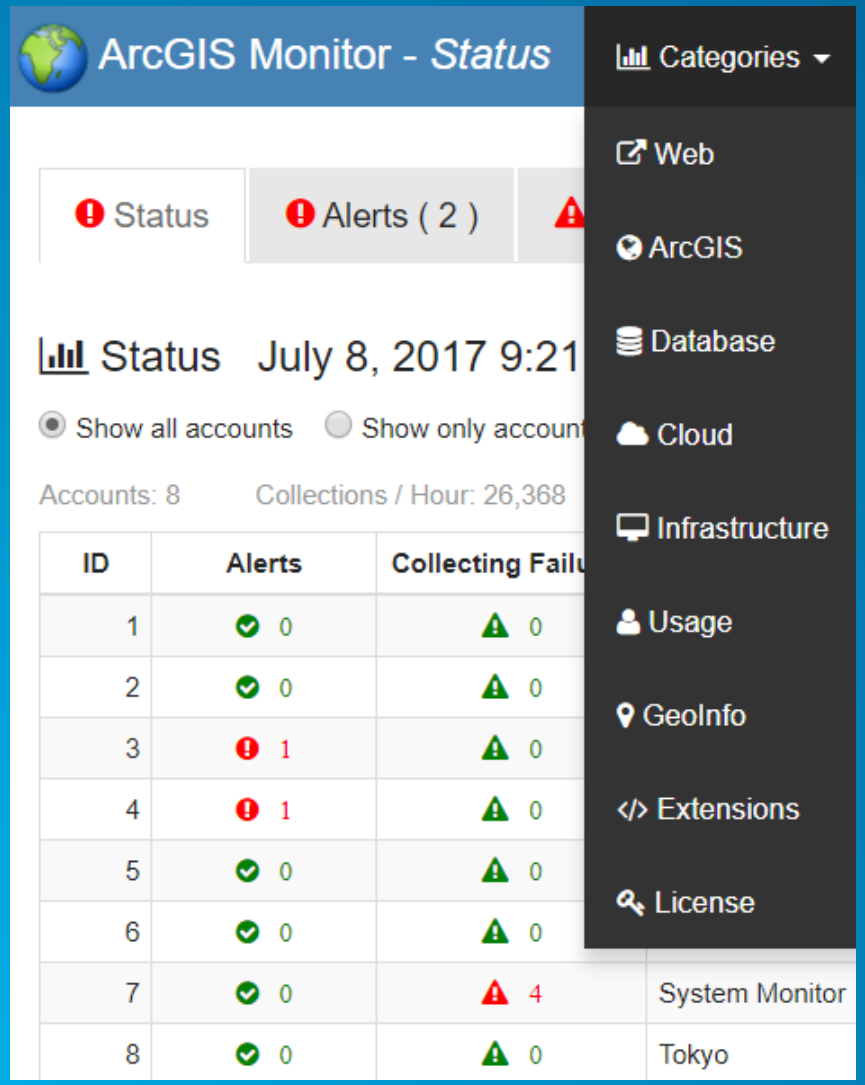
ArcGIS Data Store

Database

When problems arise, what is the root cause?

ArcGIS Monitor

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

Common cases

ArcGIS Enterprise is often a victim of:

Overload:

-users

-services

Unstable Infrastructure:

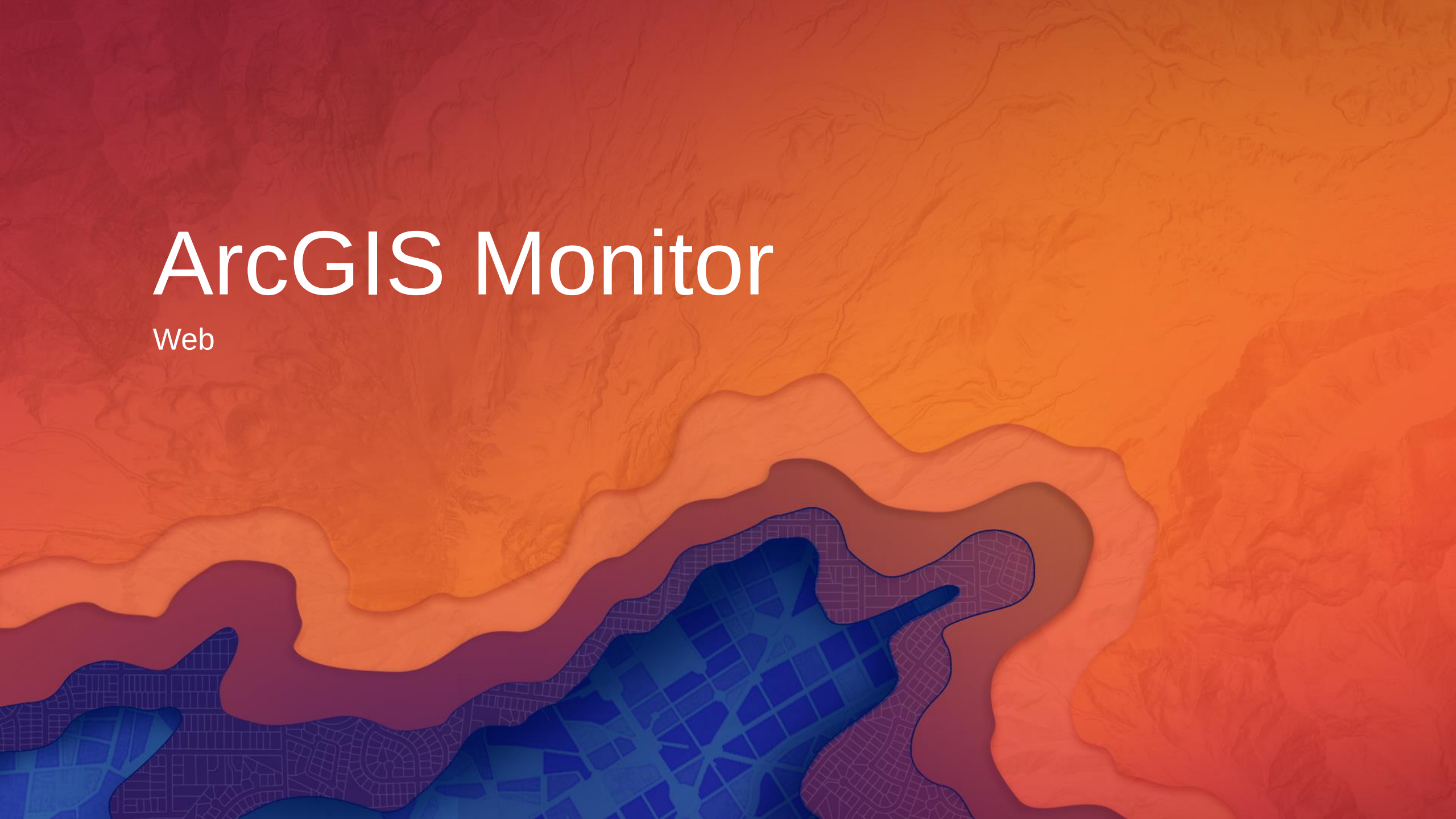
-Network
-NAS
-VMWare

Bottlenecks:

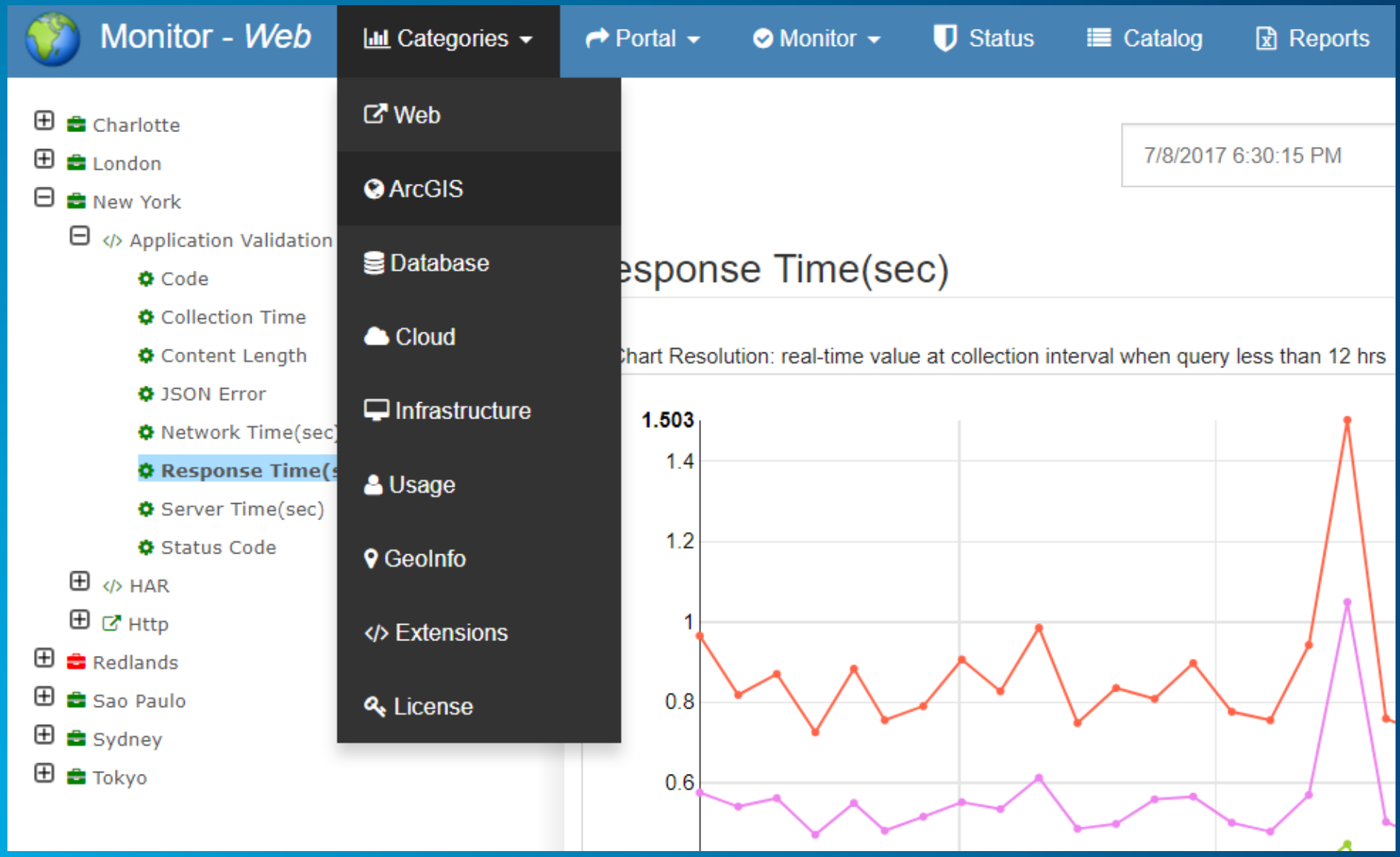
-configuration
-maintenance
-workflows

ArcGIS Monitor

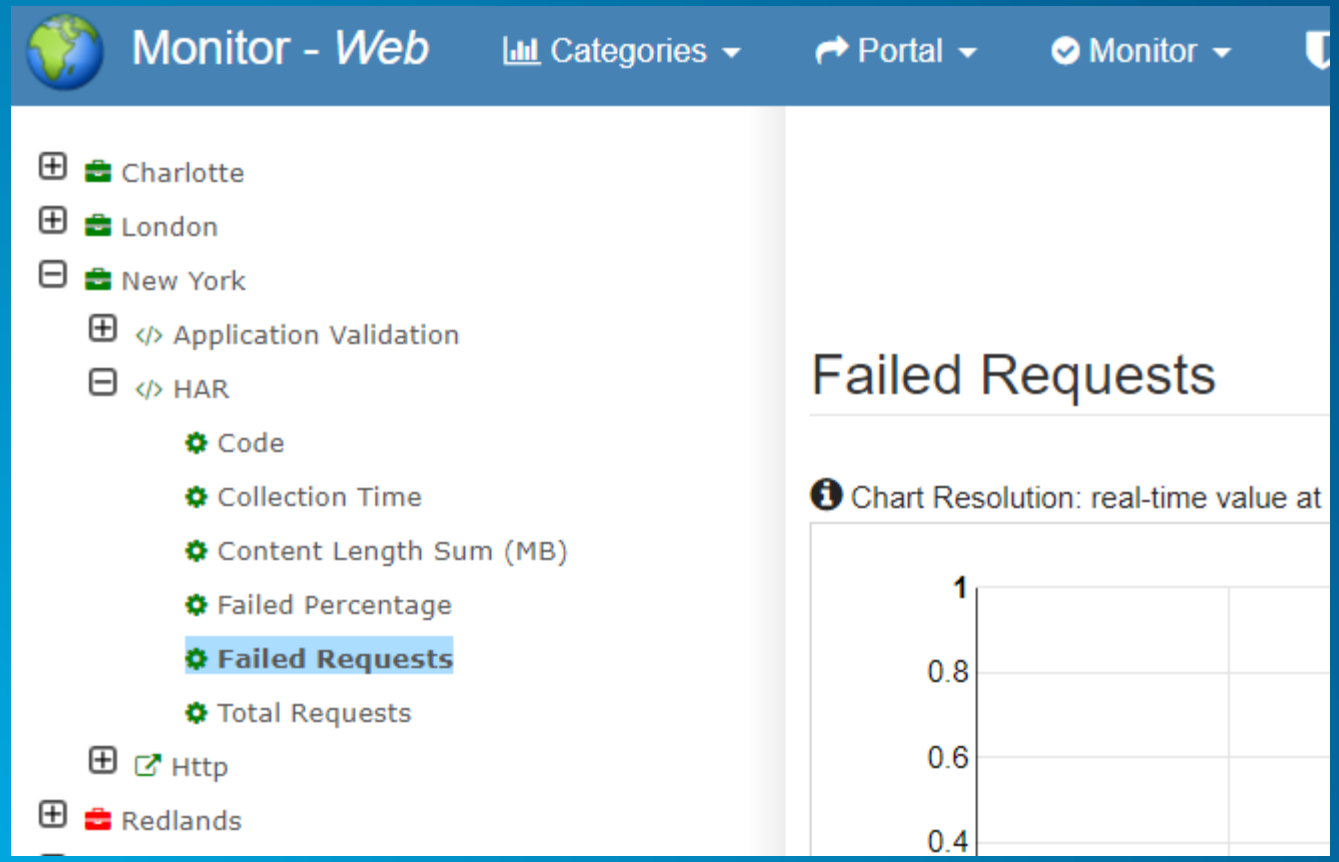
Web



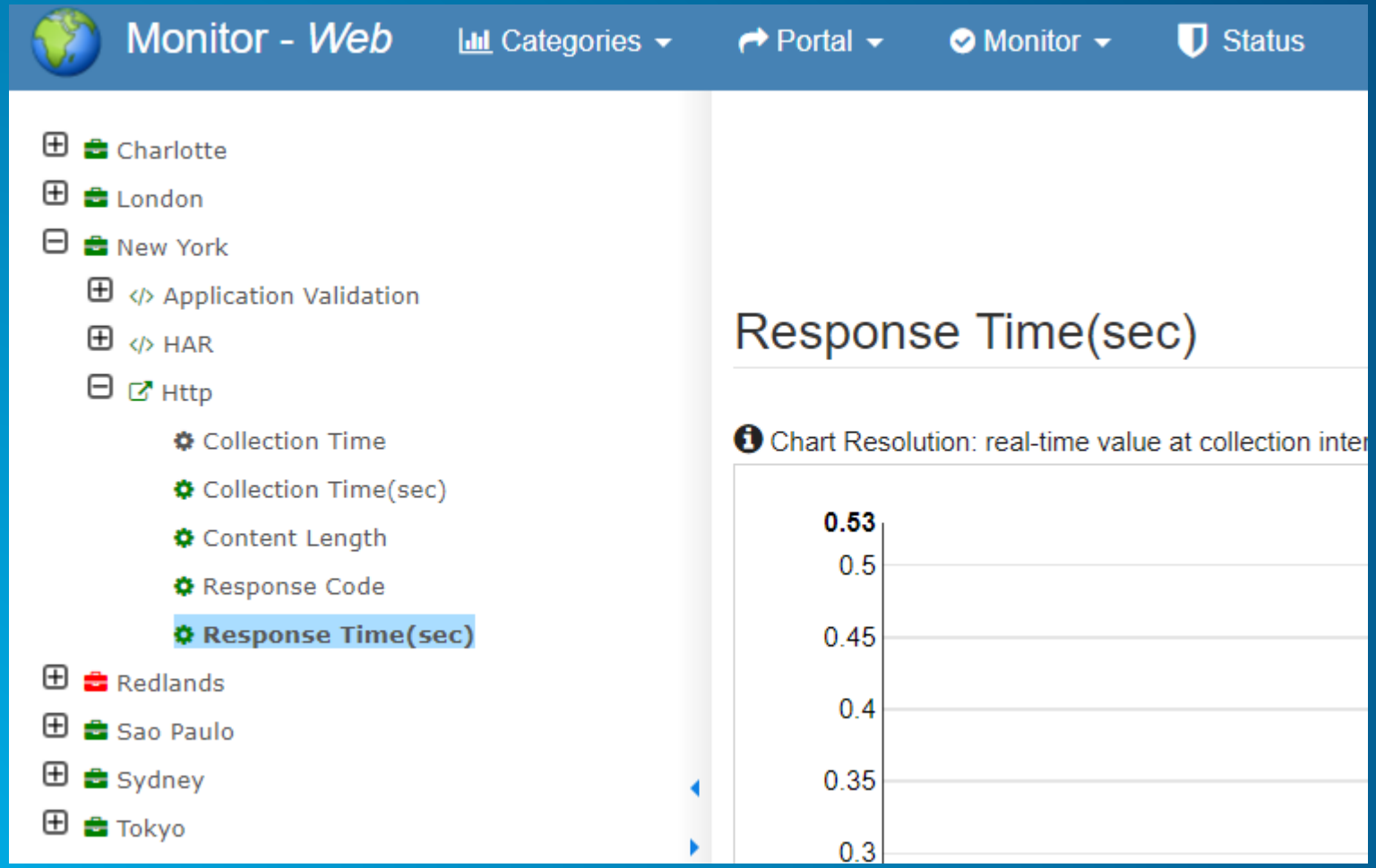
Web Application Validation



HAR

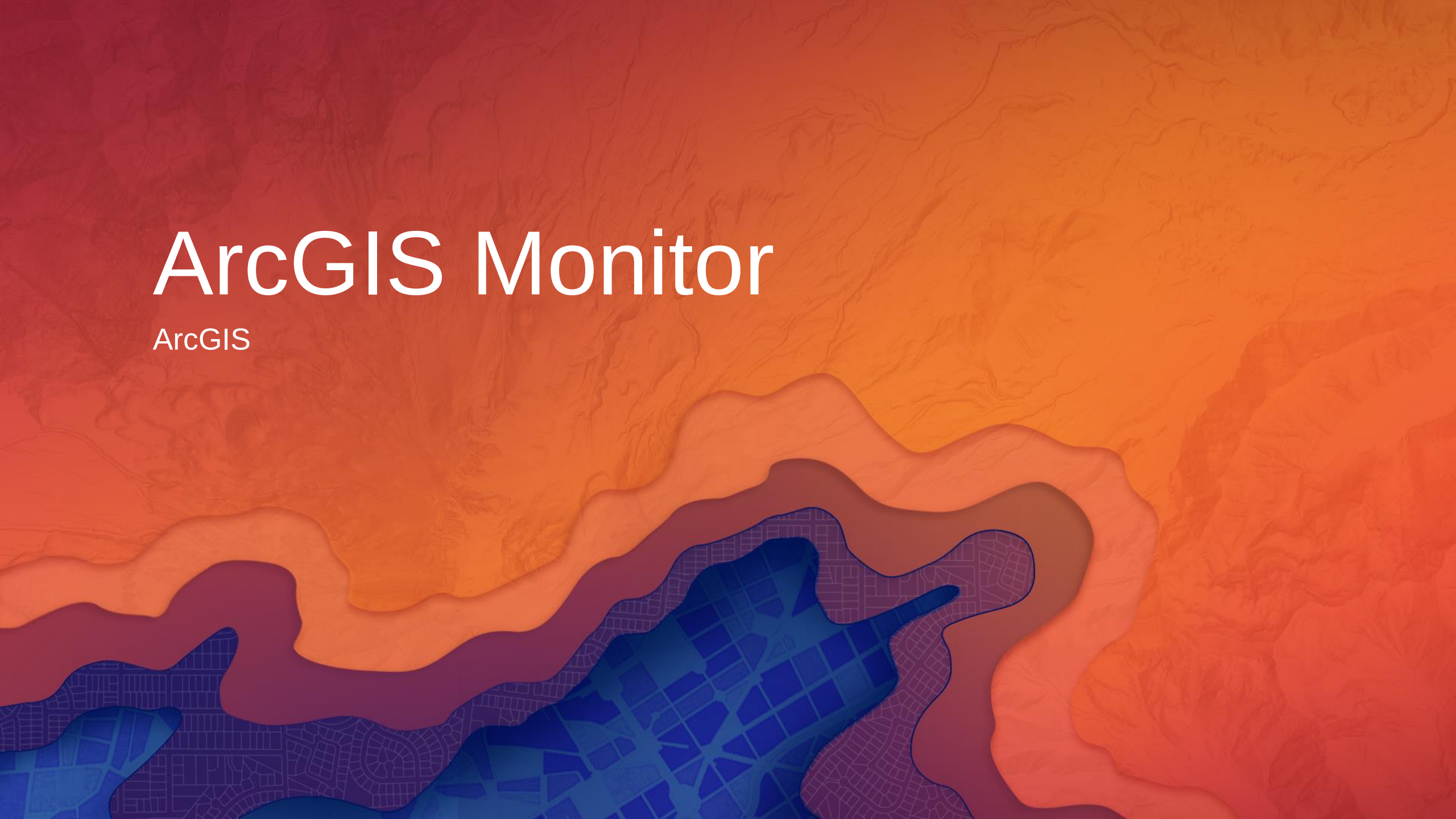

Monitor - Web
Categories
Portal
Monitor
Charlotte
London
New York
Application Validation
HAR
Code
Collection Time
Content Length Sum (MB)
Failed Percentage
Failed Requests
Total Requests
Http
Redlands
Failed Requests
Chart Resolution: real-time value at
1
0.8
0.6
0.4

HTTP

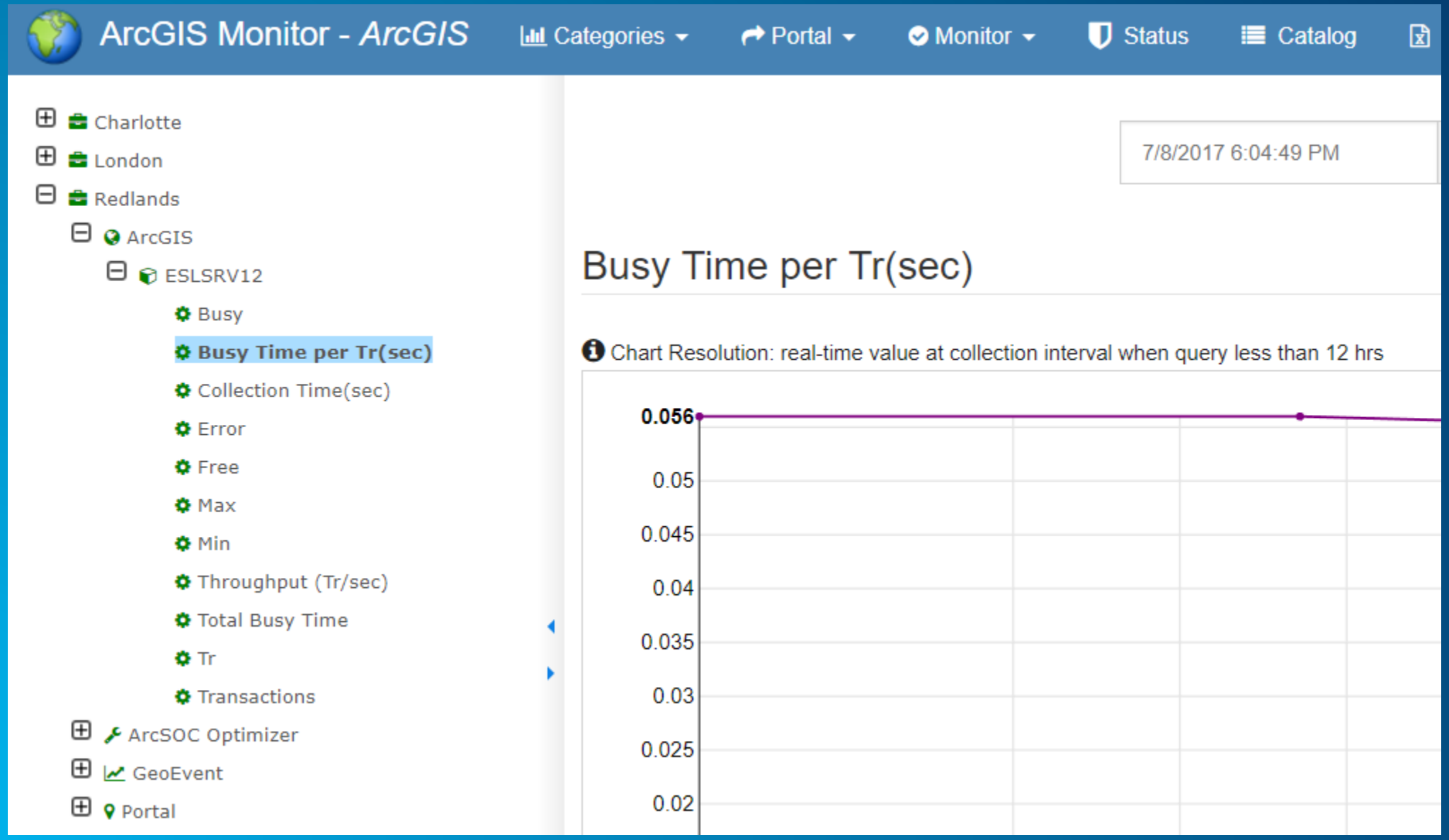

Monitor - Web
Categories
Portal
Monitor
Status
Charlotte
London
New York
Application Validation
HAR
Http
Collection Time
Collection Time(sec)
Content Length
Response Code
Response Time(sec)
Redlands
Sao Paulo
Sydney
Tokyo
Response Time(sec)
Chart Resolution: real-time value at collection inter
0.53
0.5
0.45
0.4
0.35
0.3

ArcGIS Monitor

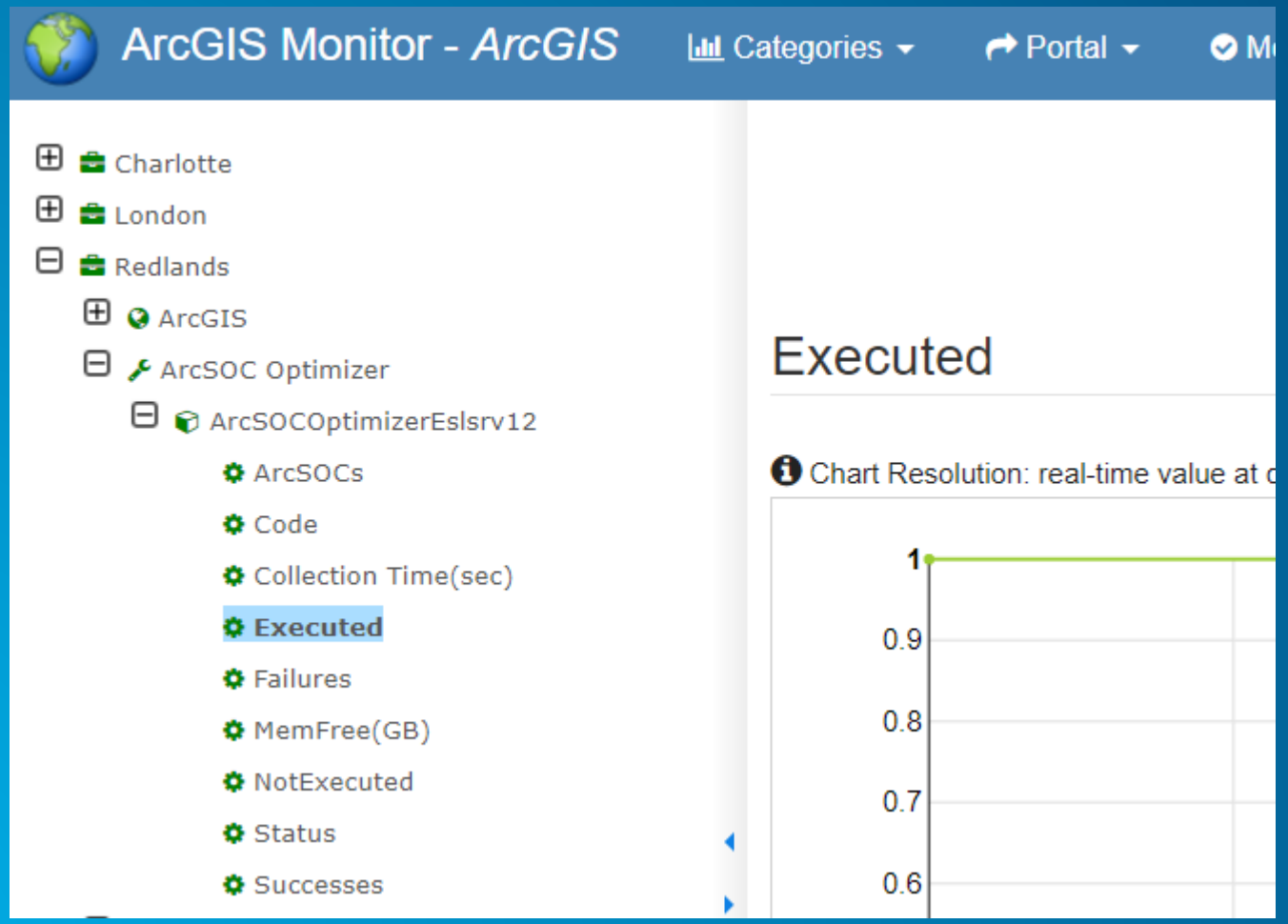
ArcGIS



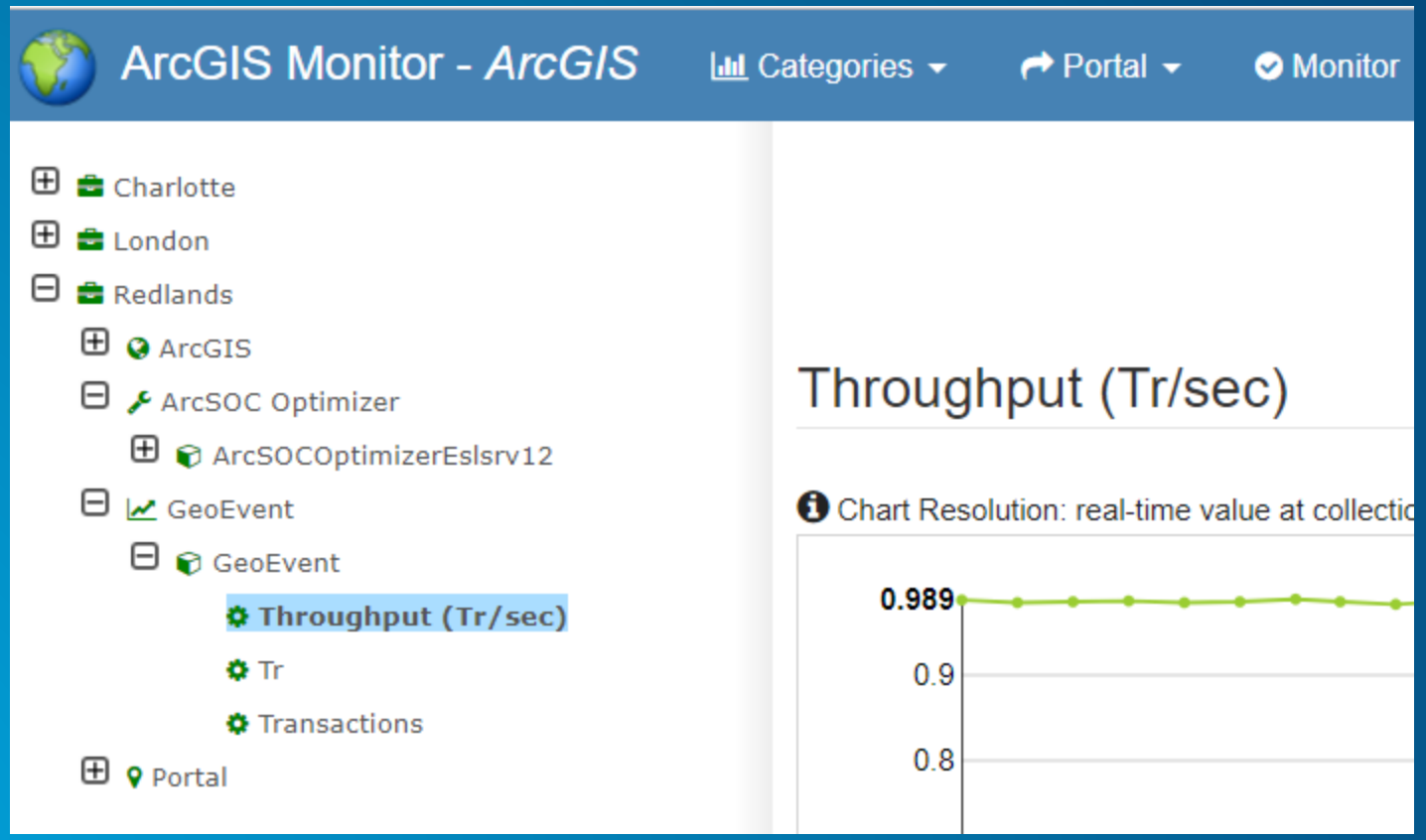
ArcGIS


ArcGIS Monitor - ArcGIS
Categories
Portal
Monitor
Status
Catalog
Charlotte
London
Redlands
ArcGIS
ESLSRV12
Busy
Busy Time per Tr(sec)
Collection Time(sec)
Error
Free
Max
Min
Throughput (Tr/sec)
Total Busy Time
Tr
Transactions
ArcSOC Optimizer
GeoEvent
Portal
7/8/2017 6:04:49 PM
Busy Time per Tr(sec)
Chart Resolution: real-time value at collection interval when query less than 12 hrs
0.056
0.05
0.045
0.04
0.035
0.03
0.025
0.02

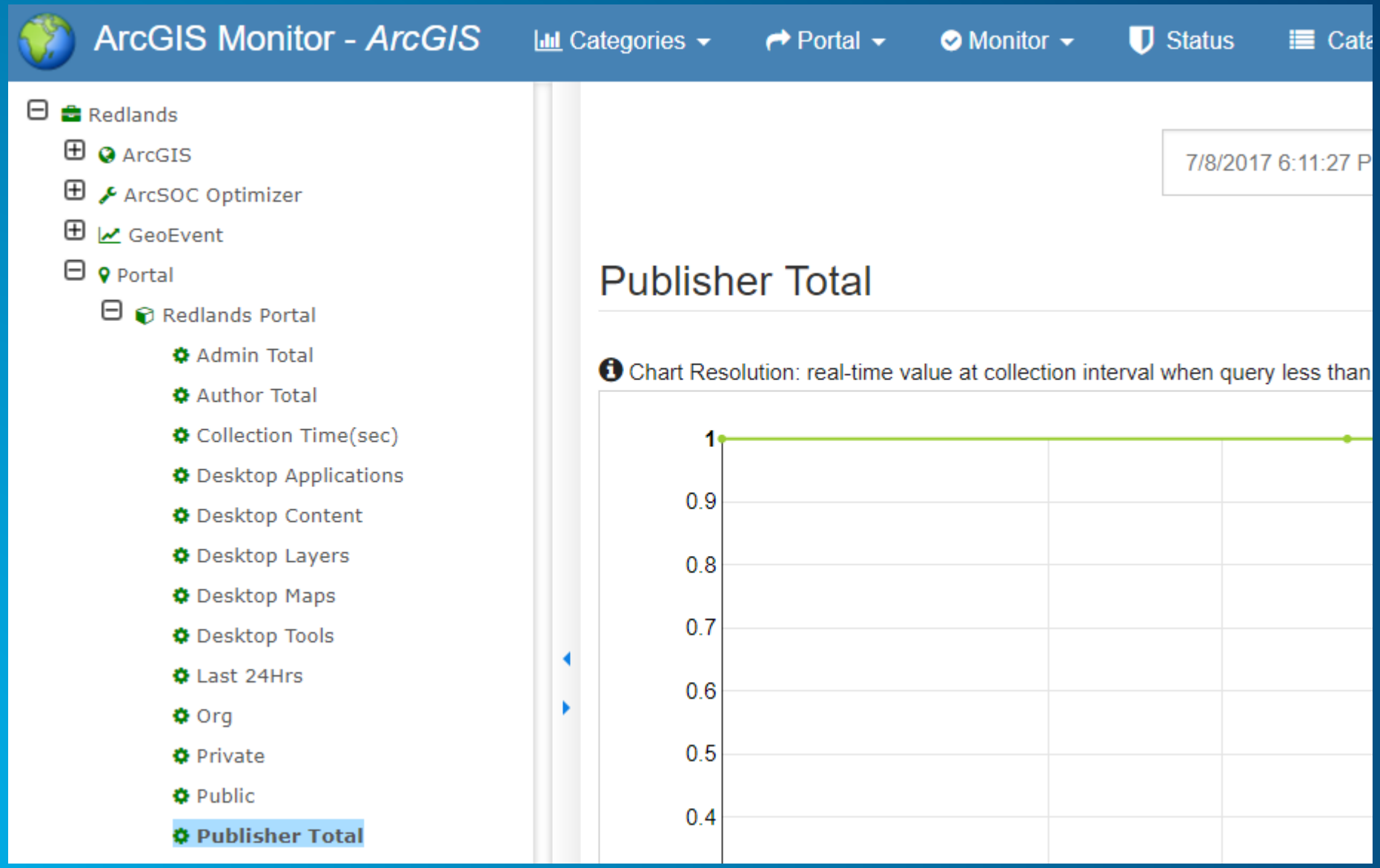
ArcSOC Optimizer



GeoEvent

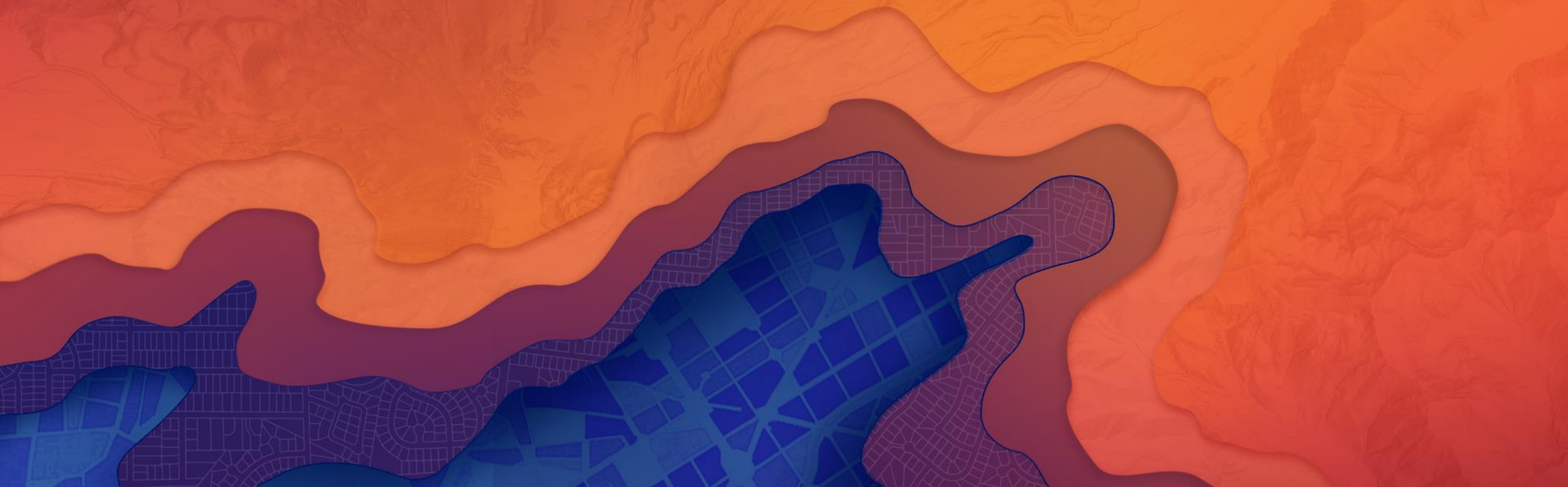

ArcGIS Monitor - ArcGIS
Categories
Portal
Monitor
Charlotte
London
Redlands
ArcGIS
ArcSOC Optimizer
ArcSOCOptimizerEslsrv12
GeoEvent
GeoEvent
Throughput (Tr/sec)
Tr
Transactions
Portal
Throughput (Tr/sec)
Chart Resolution: real-time value at collectio
0.989
0.9
0.8

Portal

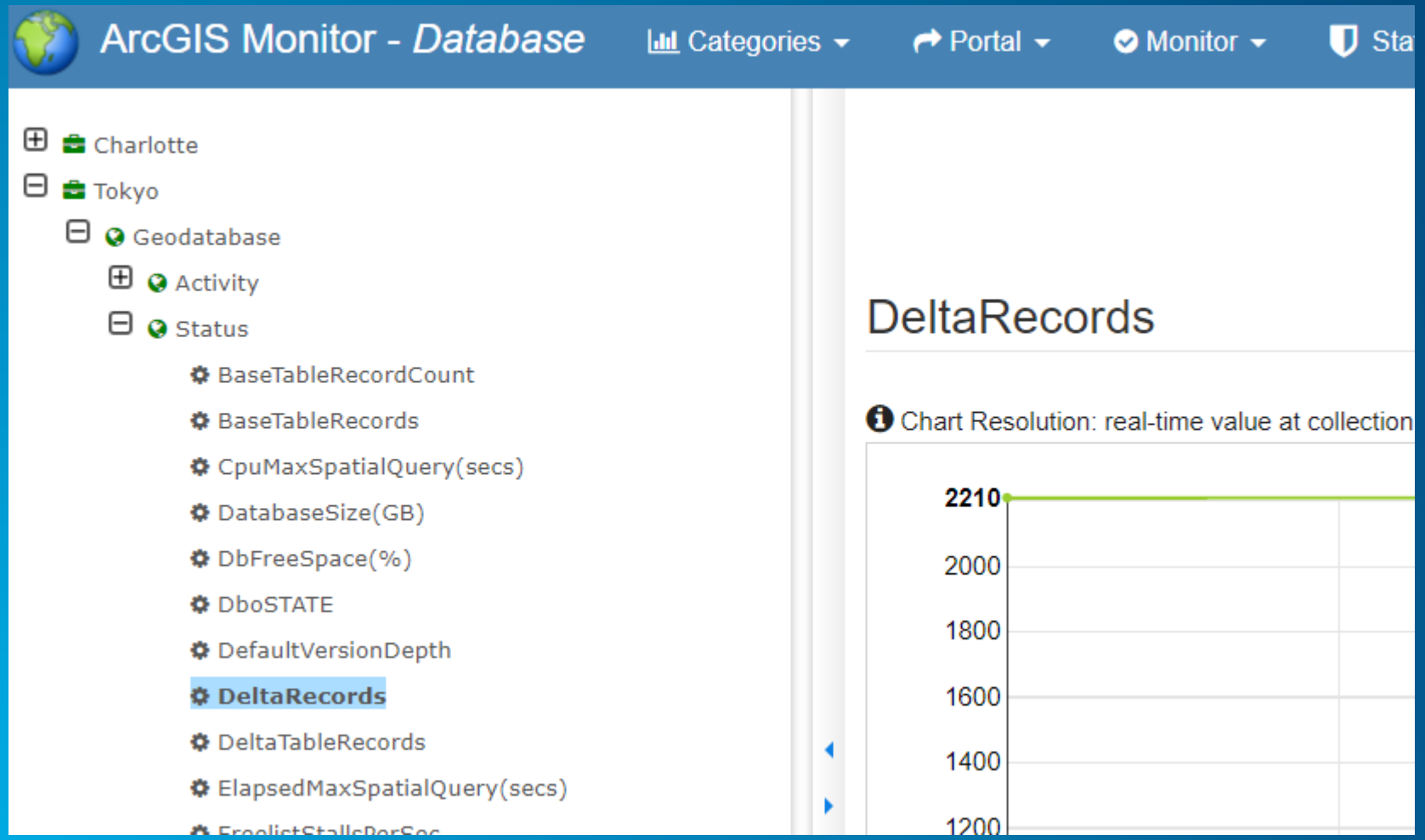

ArcGIS Monitor - ArcGIS
Categories
Portal
Monitor
Status
Redlands
ArcGIS
ArcSOC Optimizer
GeoEvent
Portal
Redlands Portal
Admin Total
Author Total
Collection Time(sec)
Desktop Applications
Desktop Content
Desktop Layers
Desktop Maps
Desktop Tools
Last 24Hrs
Org
Private
Public
Publisher Total
7/8/2017 6:11:27 P
Publisher Total
Chart Resolution: real-time value at collection interval when query less than
1
0.9
0.8
0.7
0.6
0.5
0.4

ArcGIS Monitor

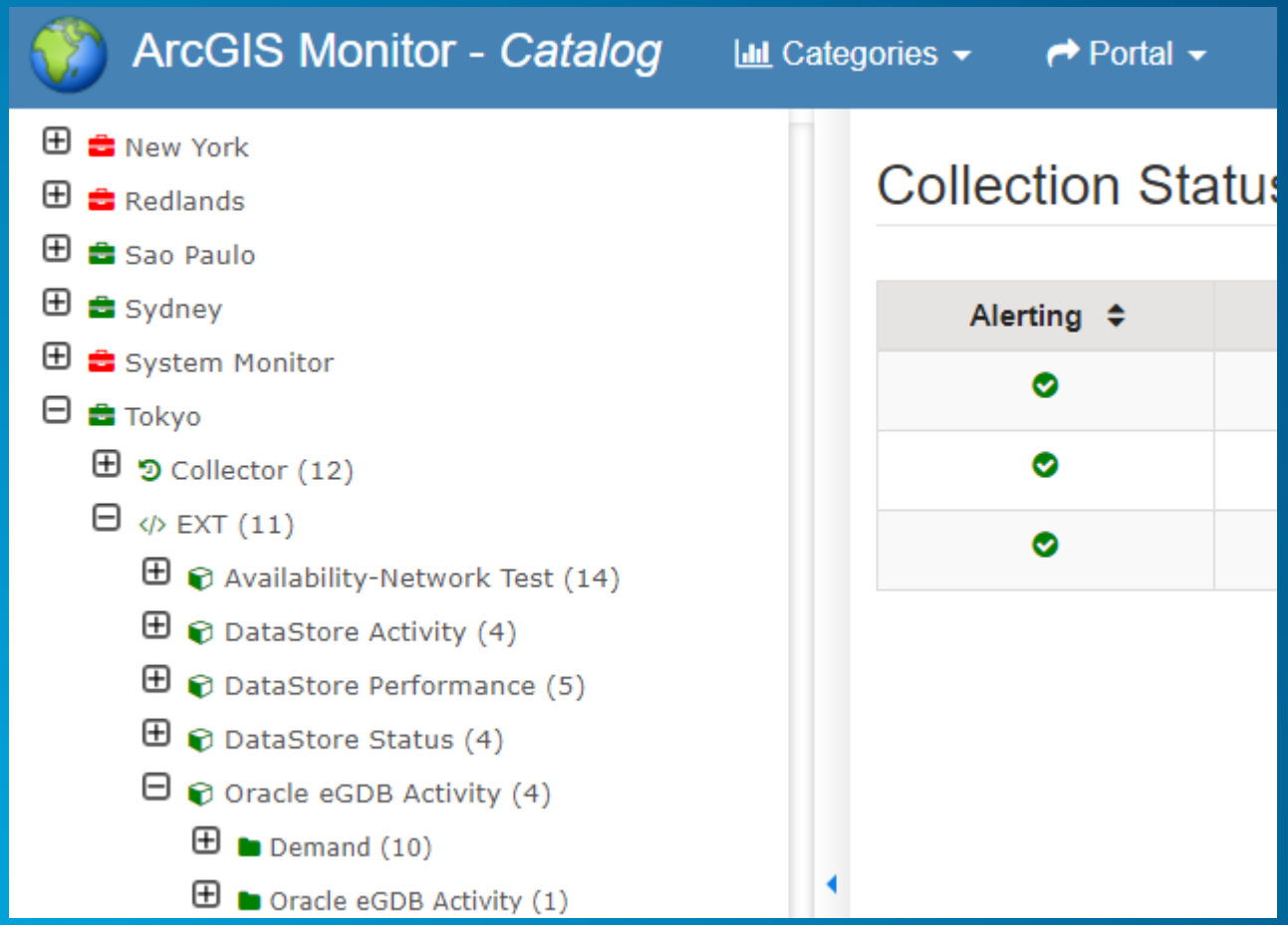
Database



Database

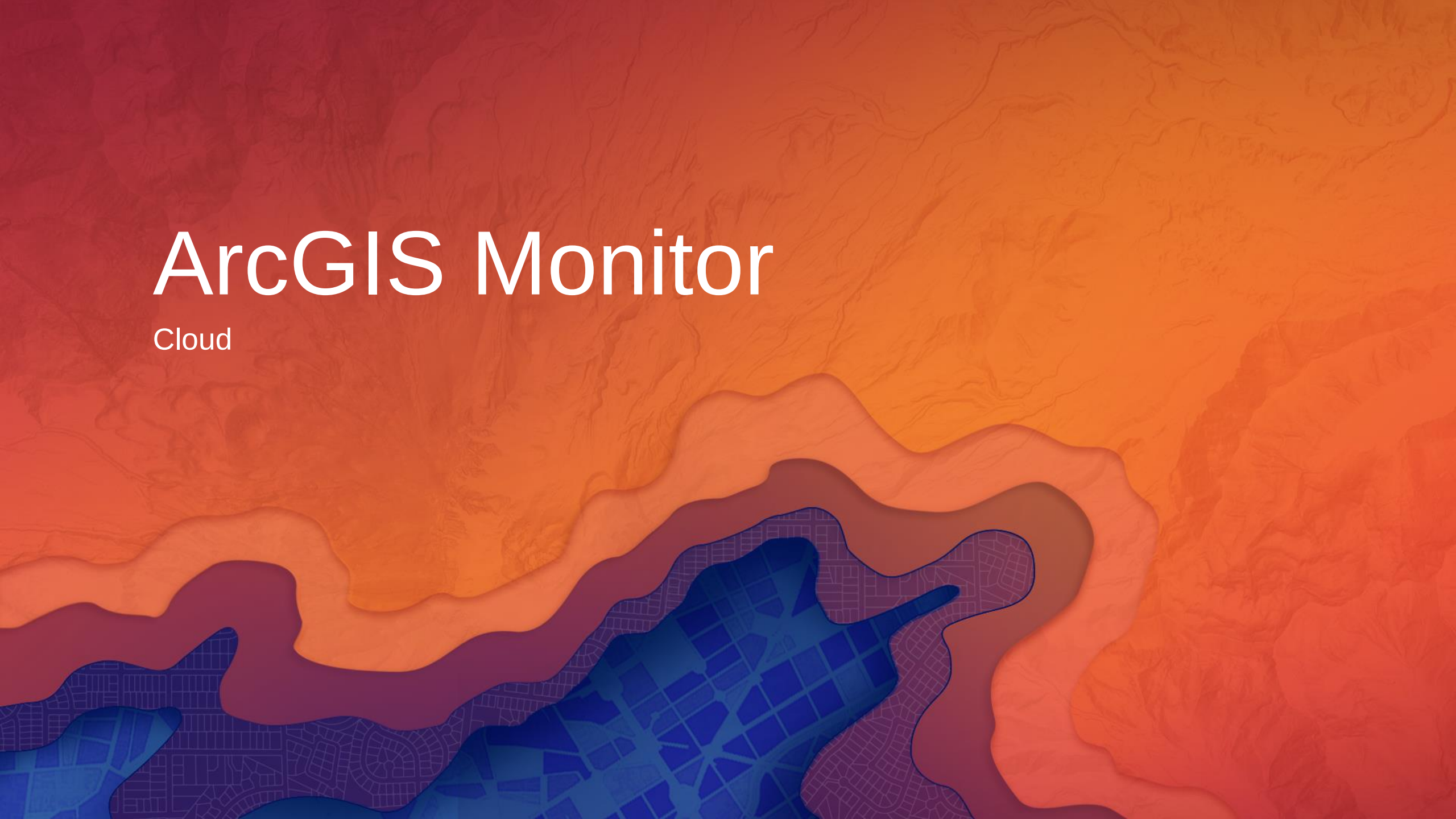

ArcGIS Monitor - Database
Categories
Portal
Monitor
Sta
Charlotte
Tokyo
Geodatabase
Activity
Status
BaseTableRecordCount
BaseTableRecords
CpuMaxSpatialQuery(secs)
DatabaseSize(GB)
DbFreeSpace(%)
DboSTATE
DefaultVersionDepth
DeltaRecords
DeltaTableRecords
ElapsedMaxSpatialQuery(secs)
DeltaRecords
Chart Resolution: real-time value at collection
2210
2000
1800
1600
1400
1200

Database Catalog view

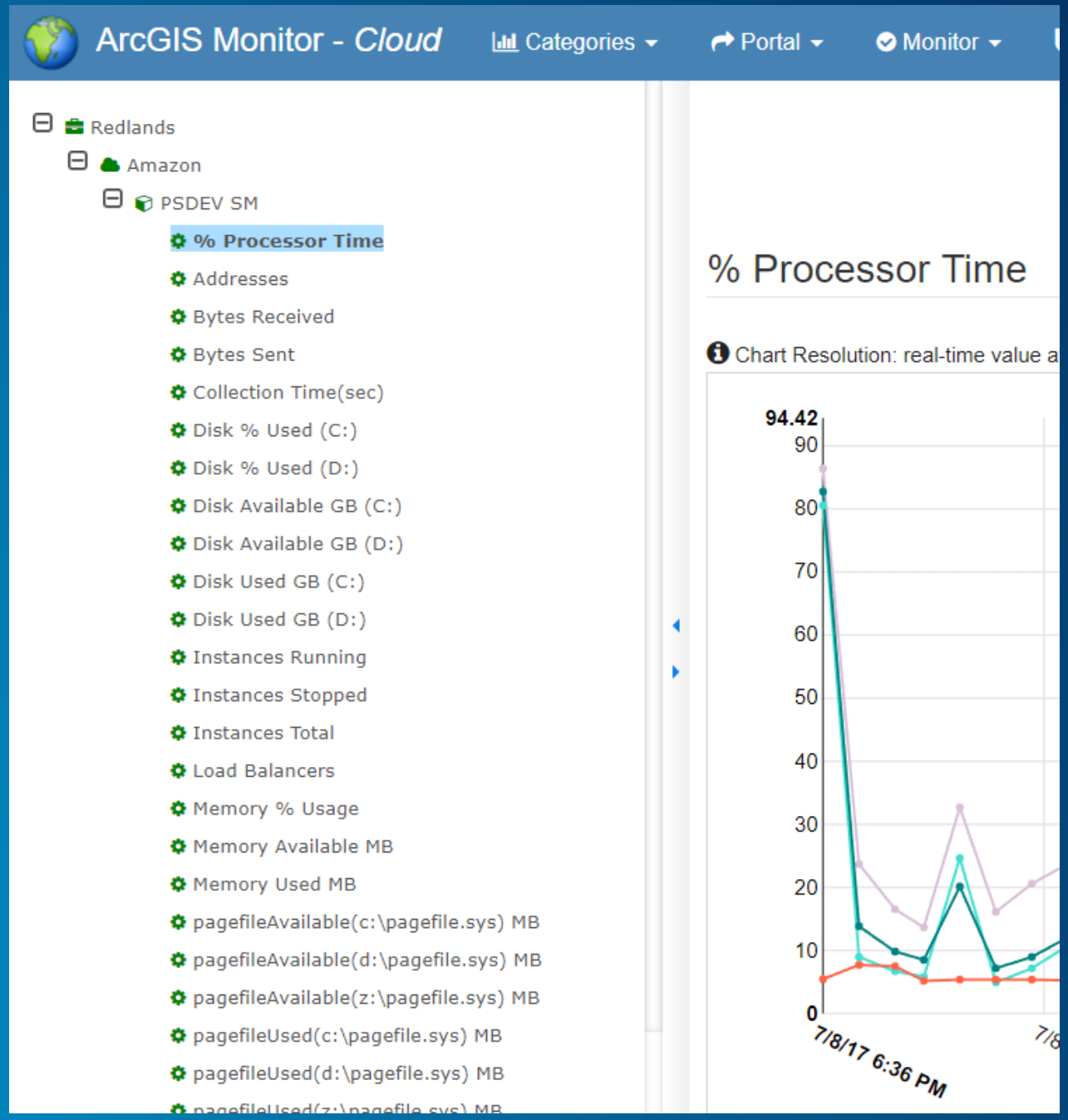


ArcGIS Monitor

Cloud

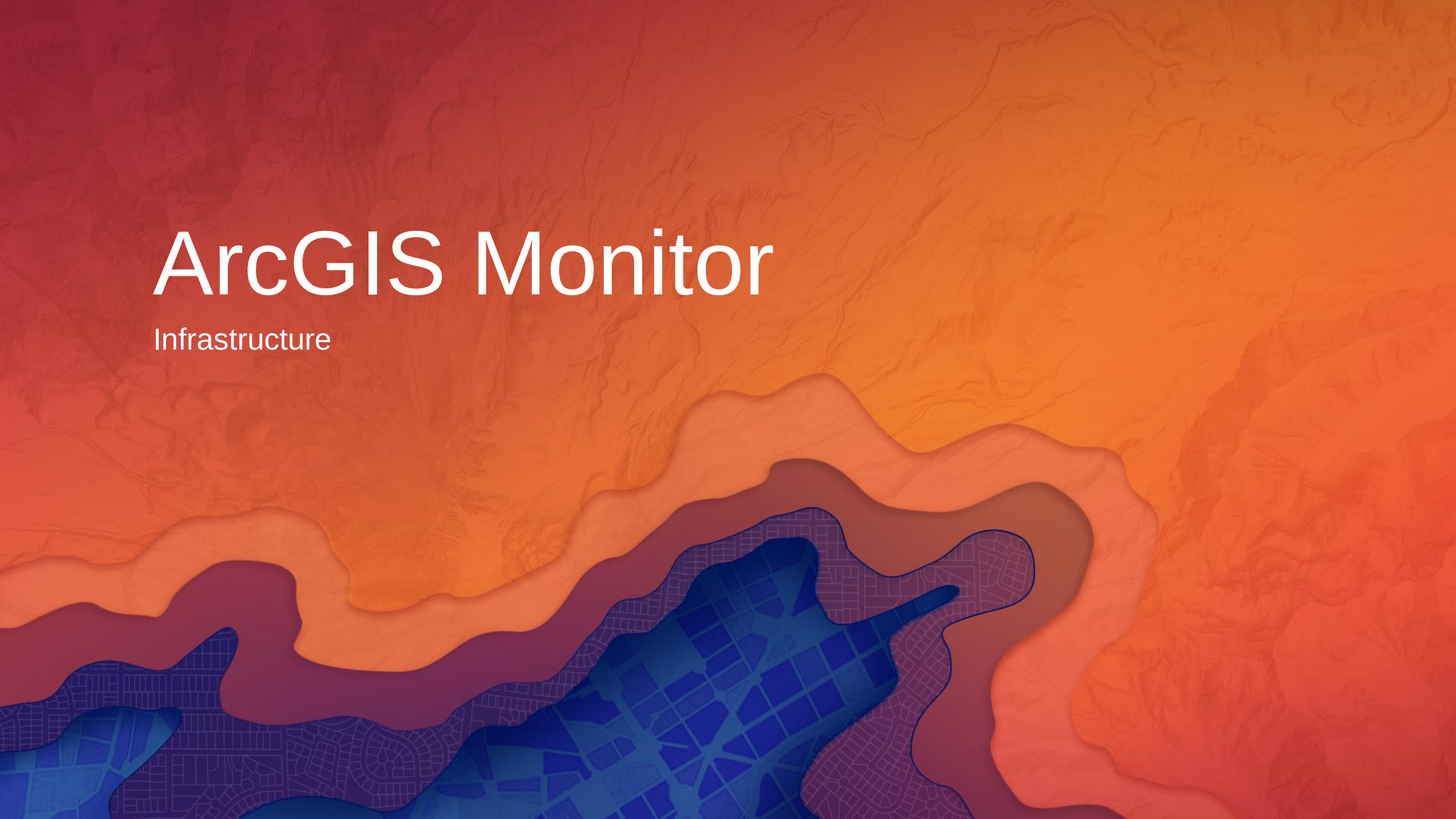


Cloud (AWS)

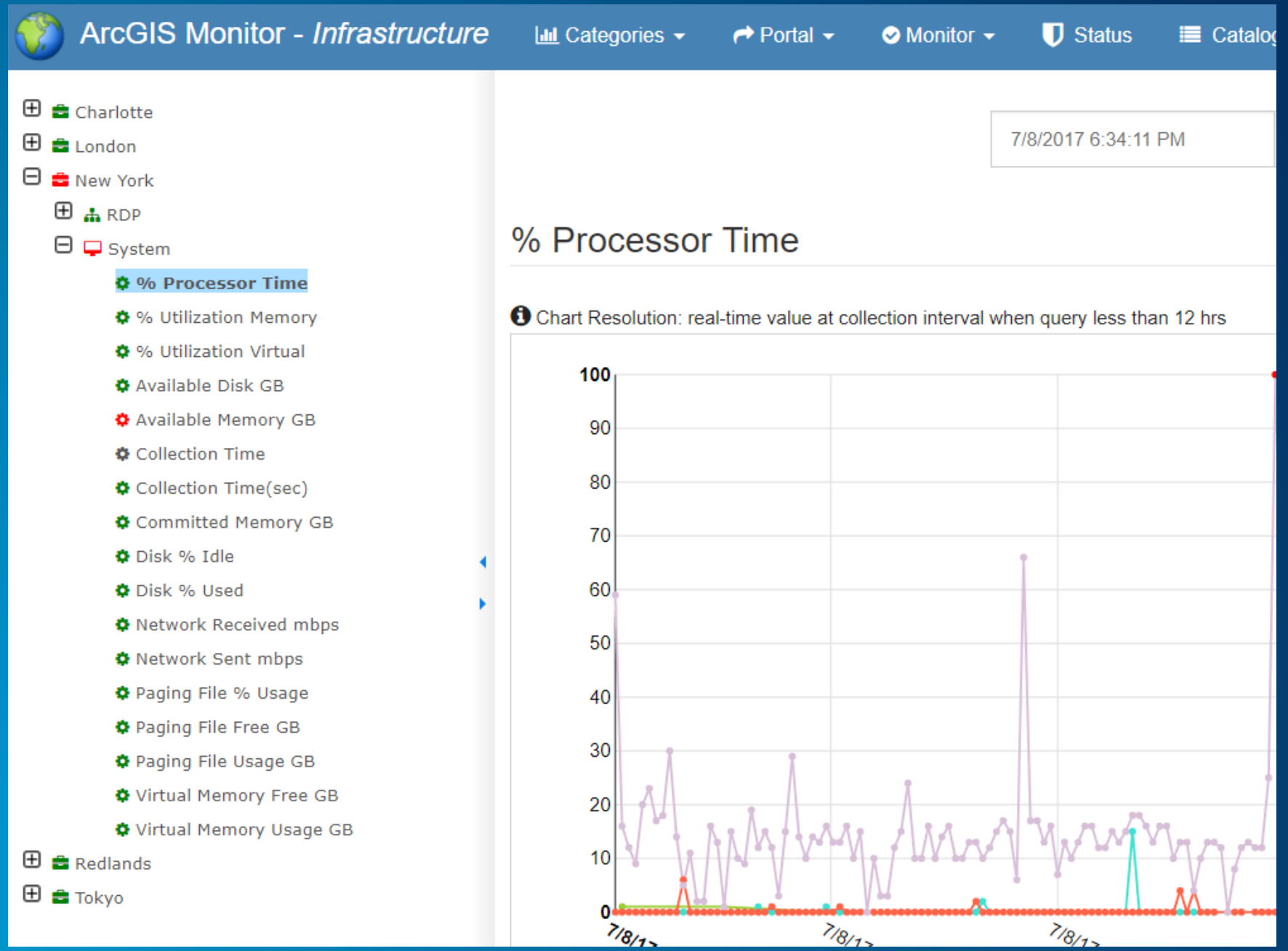

ArcGIS Monitor - Cloud
Categories
Portal
Monitor
Redlands
Amazon
PSDEV SM
% Processor Time
Addresses
Bytes Received
Bytes Sent
Collection Time(sec)
Disk % Used (C:)
Disk % Used (D:)
Disk Available GB (C:)
Disk Available GB (D:)
Disk Used GB (C:)
Disk Used GB (D:)
Instances Running
Instances Stopped
Instances Total
Load Balancers
Memory % Usage
Memory Available MB
Memory Used MB
pagefileAvailable(c:\pagefile.sys) MB
pagefileAvailable(d:\pagefile.sys) MB
pagefileAvailable(z:\pagefile.sys) MB
pagefileUsed(c:\pagefile.sys) MB
pagefileUsed(d:\pagefile.sys) MB
% Processor Time
Chart Resolution: real-time value a
94.42
90
80
70
60
50
40
30
20
10
0
7/8/17 6:36 PM

ArcGIS Monitor

Infrastructure



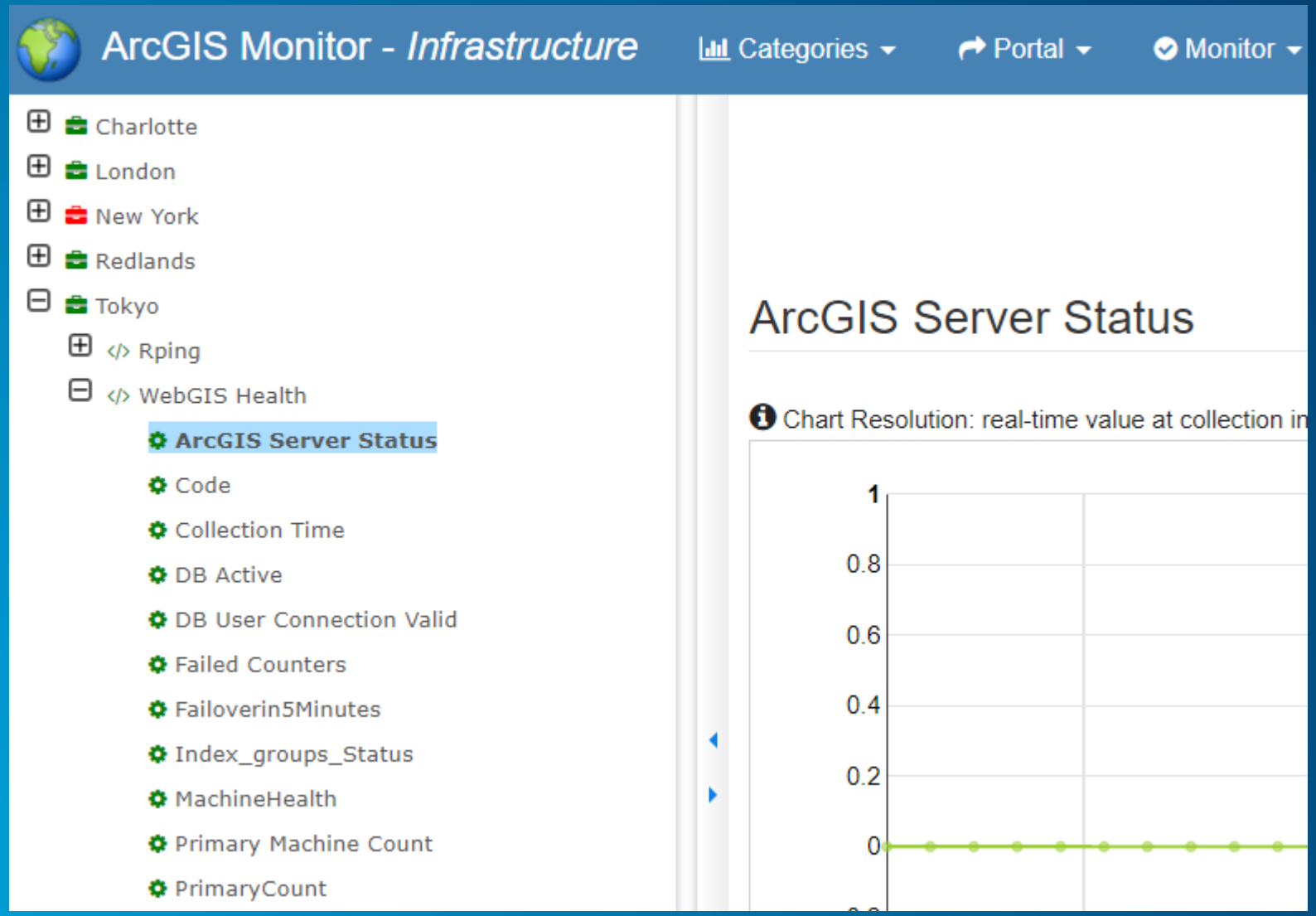
System


ArcGIS Monitor - Infrastructure
Categories
Portal
Monitor
Status
Charlotte
London
New York
RDP
System
% Processor Time
% Utilization Memory
% Utilization Virtual
Available Disk GB
Available Memory GB
Collection Time
Collection Time(sec)
Committed Memory GB
Disk % Idle
Disk % Used
Network Received mbps
Network Sent mbps
Paging File % Usage
Paging File Free GB
Paging File Usage GB
Virtual Memory Free GB
Virtual Memory Usage GB
Redlands
Tokyo
7/8/2017 6:34:11 PM
% Processor Time
Chart Resolution: real-time value at collection interval when query less than 12 hrs
100
90
80
70
60
50
40
30
20
10
0

Rping

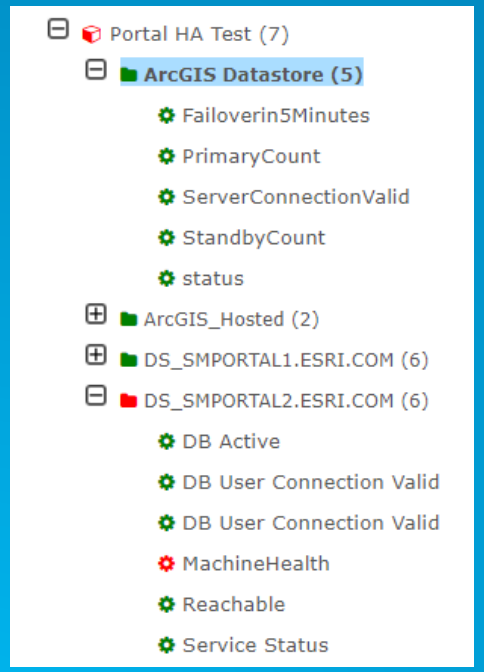

ArcGIS Monitor - Infrastructure
Categories
Portal
Monitor
Status
Catalog
Report
Charlotte
London
New York
Redlands
Tokyo
Rping
Average Netwrok Time ms
Code
Collection Time
NetworkTime ms
StatusCode
WebGIS Health
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/8/17 6:43 PM
7/8/17 7:06 PM
7/8/17 7:40 PM
7/8/17 8:13 PM
Statistics: both chart and table reflect true statistics like min, max, percentile
Item
Category
Counter
Instance
Availability-Network Test
ext
NetworkTime ms
PortalStandby---PortalLB

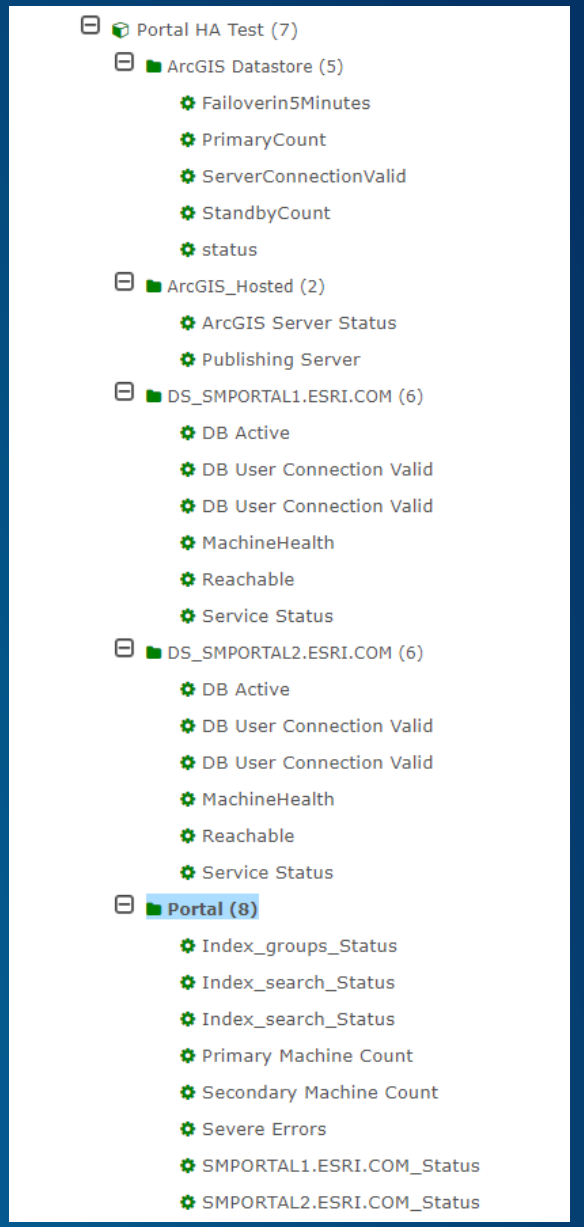
WebGIS Health (Portal HA)



WebGIS Health Extension – What do you get to monitor?

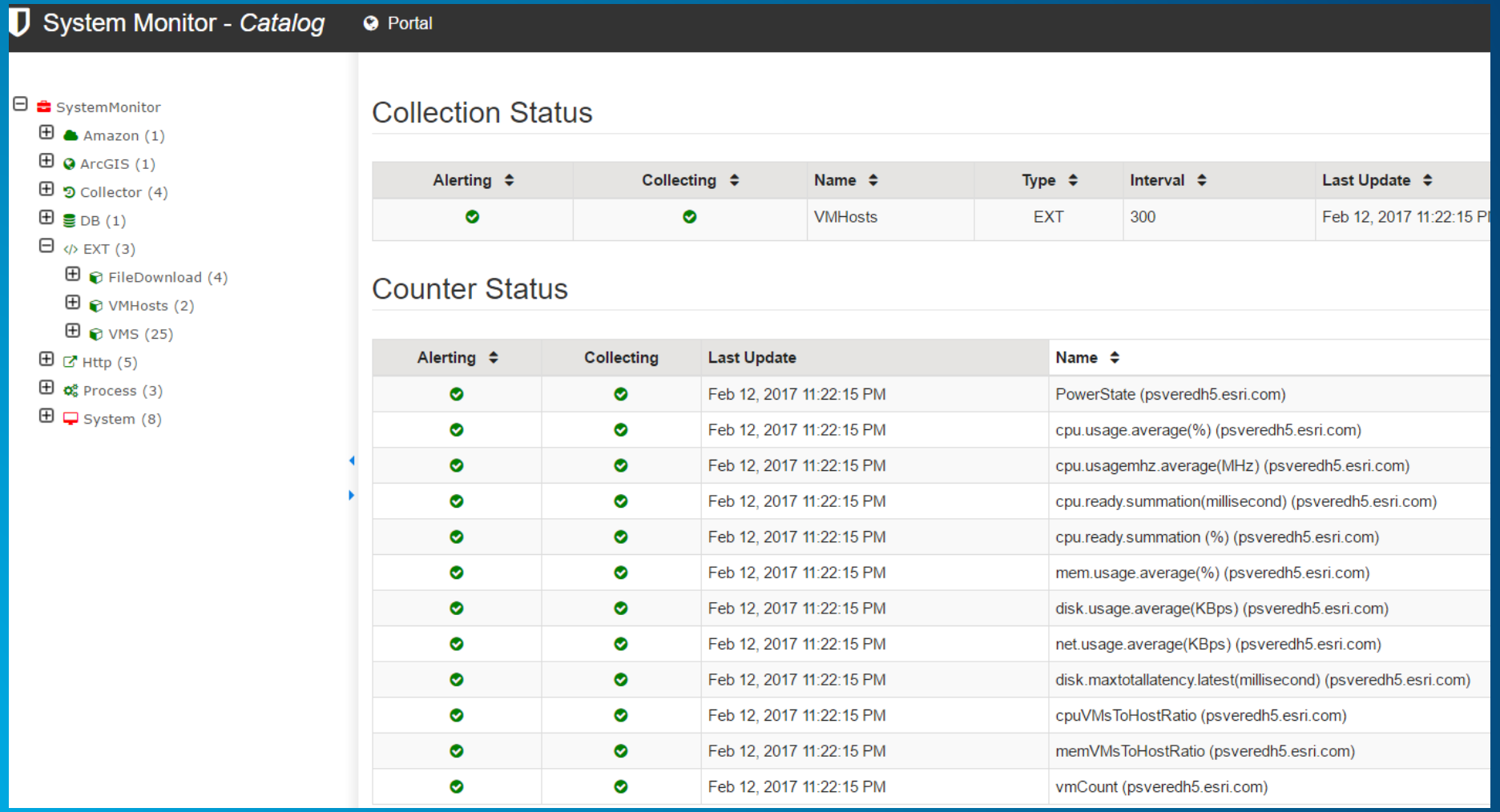
- Know about failures before system fails
  - Portal for ArcGIS Primary or Standby site failure
  - Index health of Portal for ArcGIS
  - Portal for ArcGIS thinks both machines are primary/standby
  - Hosted ArcGIS for Server's health
    - Publishing Services
  - Datastore is valid but the standby machine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





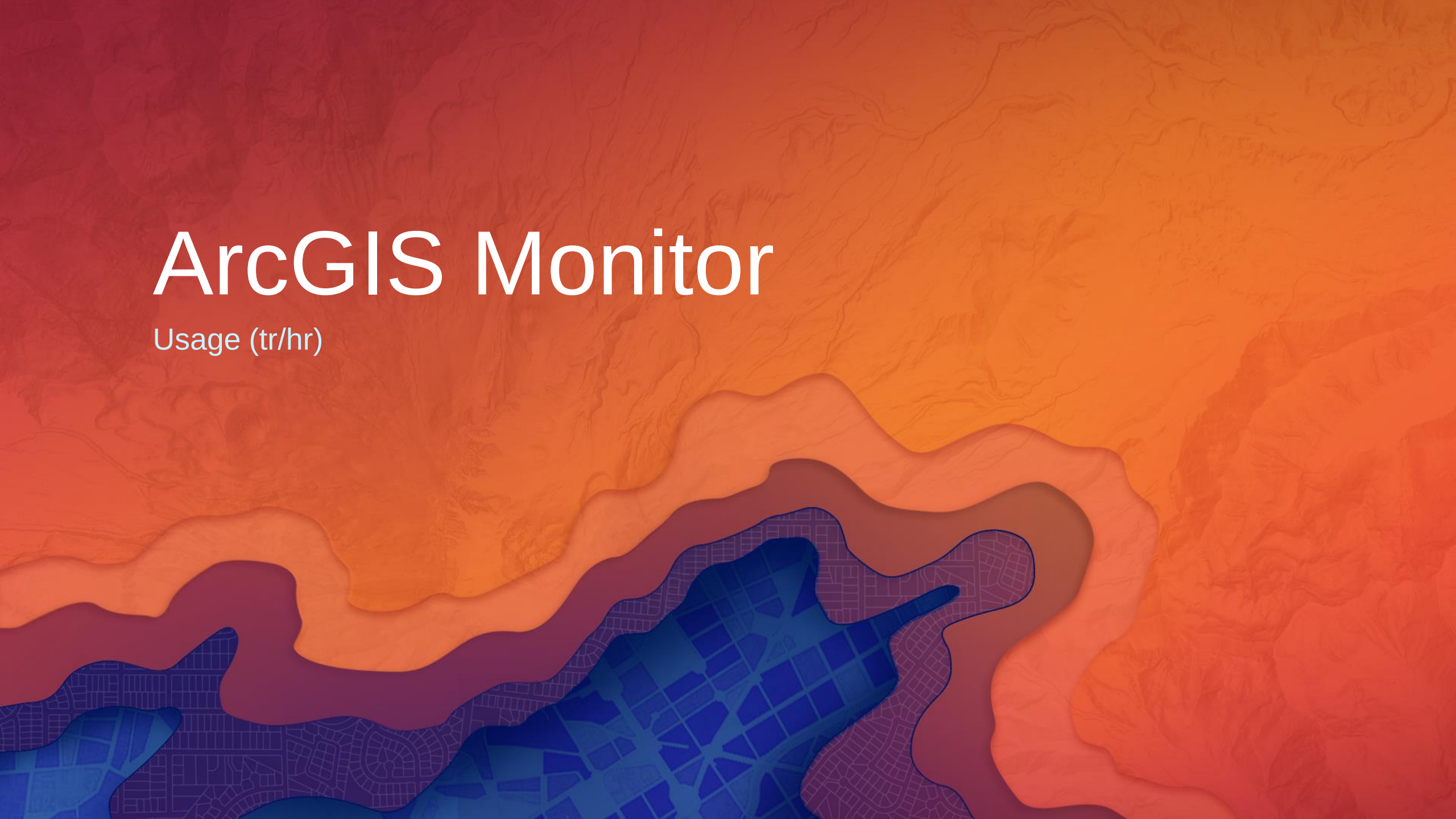
VMware

Avoid over allocation and live migration of running virtual machines during work hours

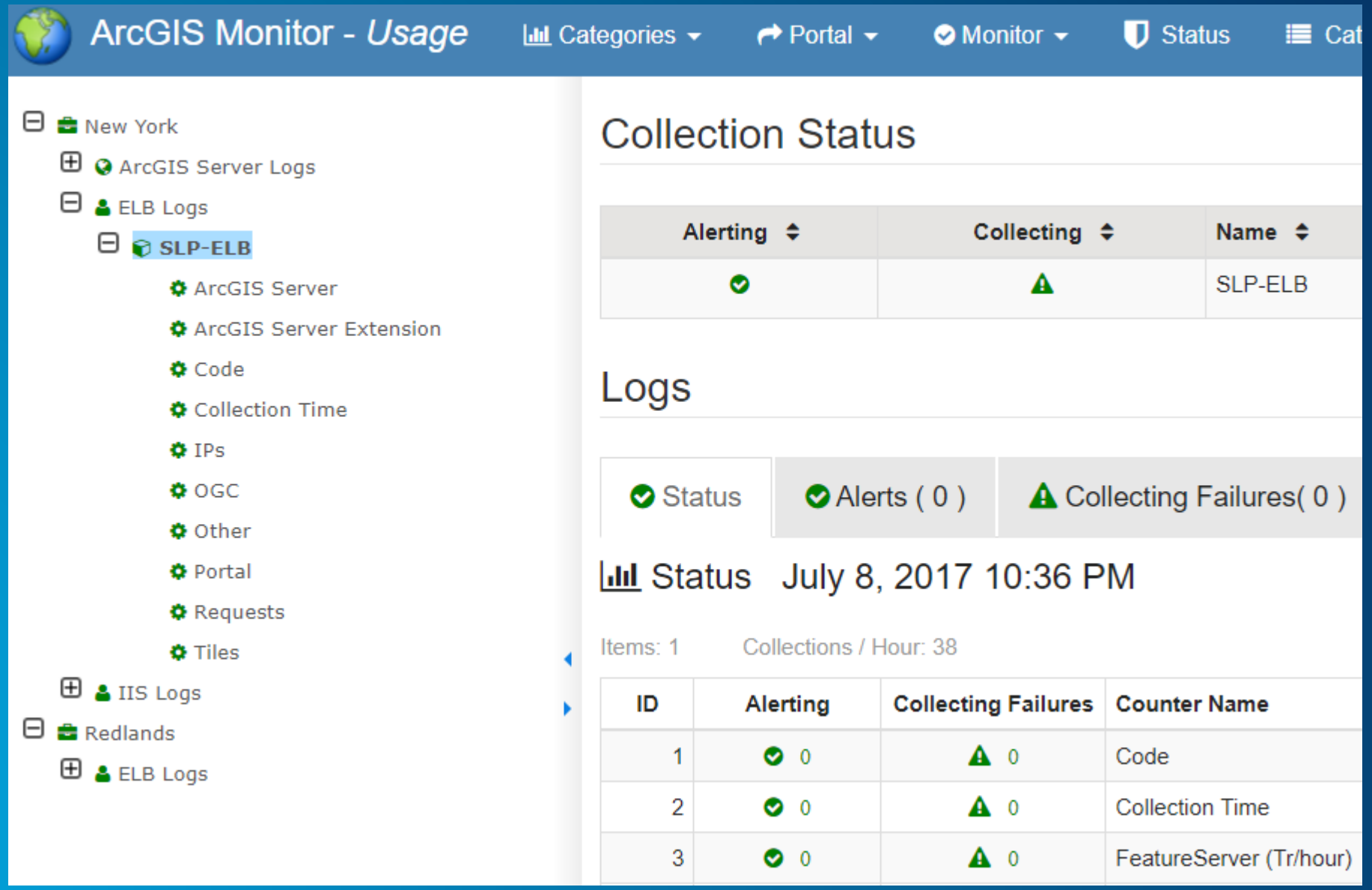


ArcGIS Monitor

Usage (tr/hr)

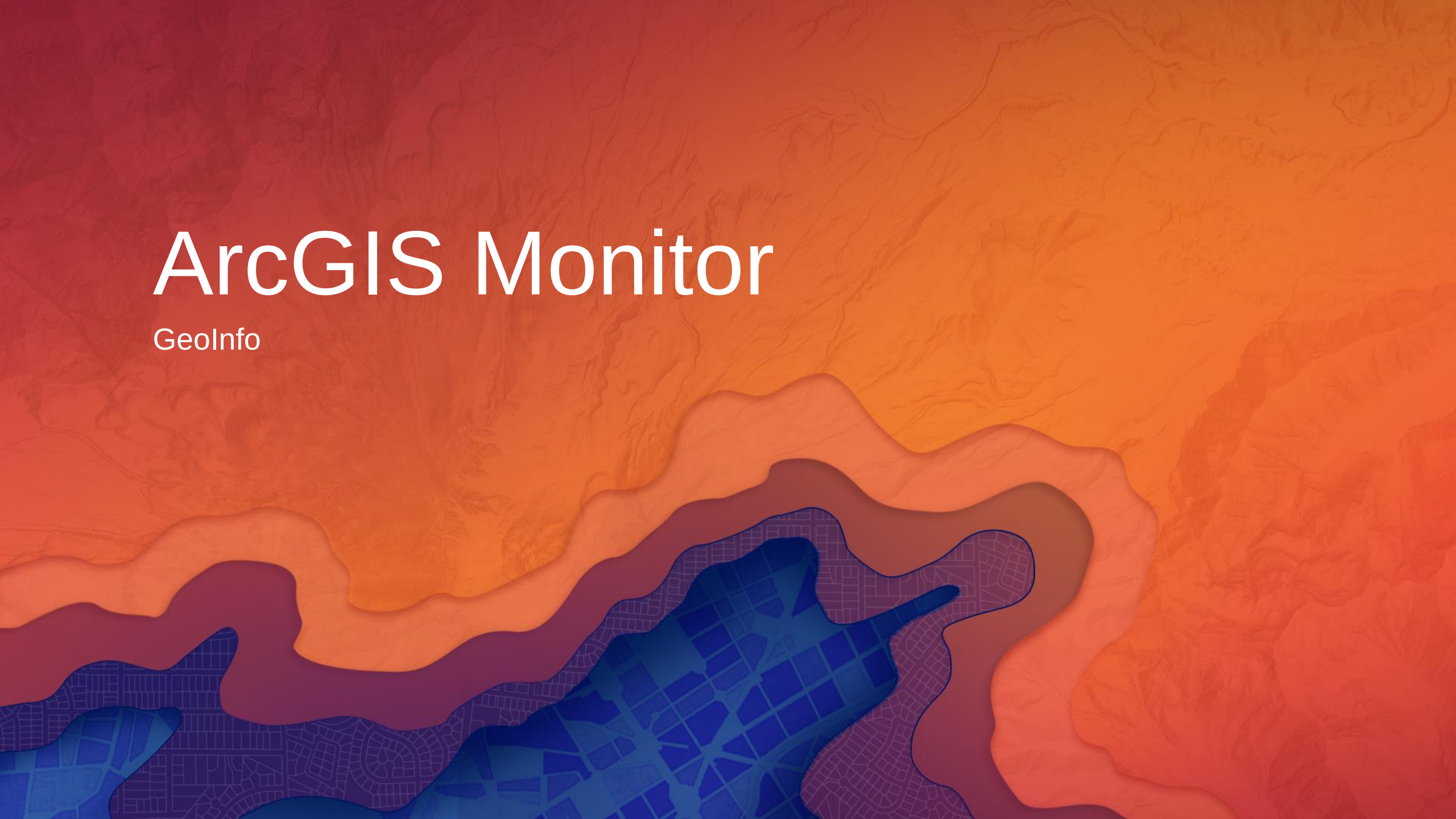


Usage (Tr/hr)

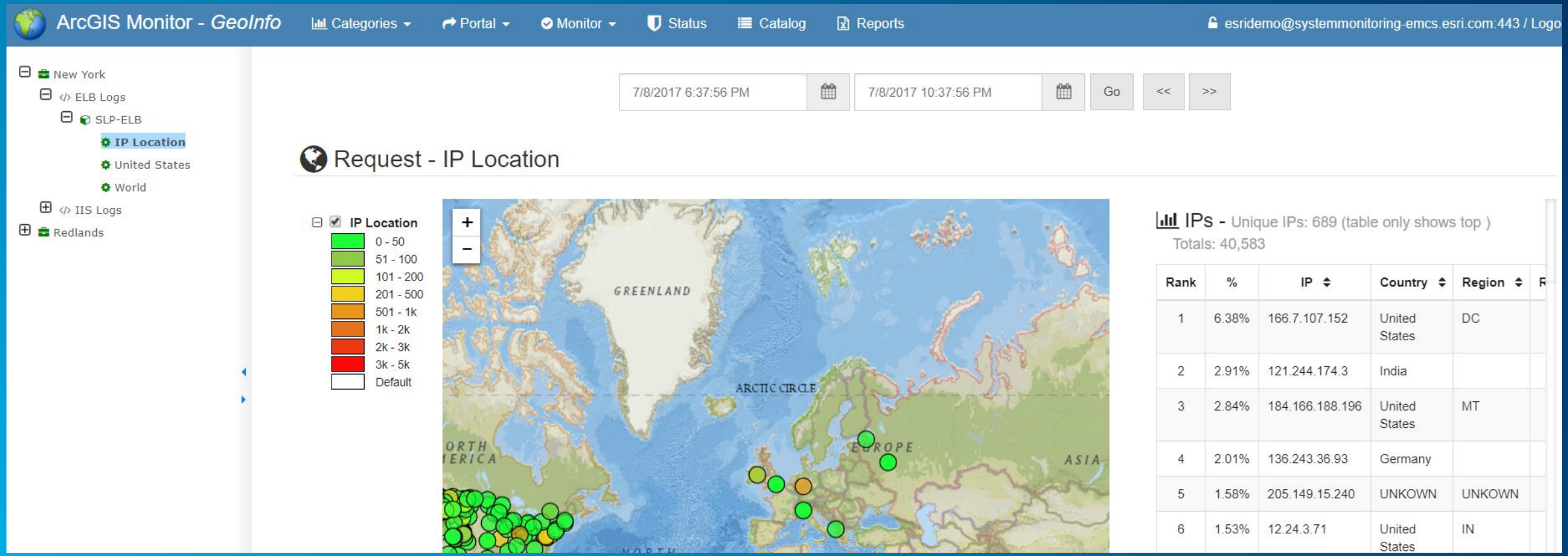

ArcGIS Monitor - Usage
Categories
Portal
Monitor
Status
Cat
New York
ArcGIS Server Logs
ELB Logs
SLP-ELB
ArcGIS Server
ArcGIS Server Extension
Code
Collection Time
IPs
OGC
Other
Portal
Requests
Tiles
IIS Logs
Redlands
ELB Logs
Collection Status
Alerting
Collecting
Name
SLP-ELB
Logs
Status
Alerts (0)
Collecting Failures(0)
Status July 8, 2017 10:36 PM
Items: 1
Collections / Hour: 38
ID
Alerting
Collecting Failures
Counter Name
1 0 0 Code
2 0 0 Collection Time
3 0 0 FeatureServer (Tr/hour)

ArcGIS Monitor

GeoInfo

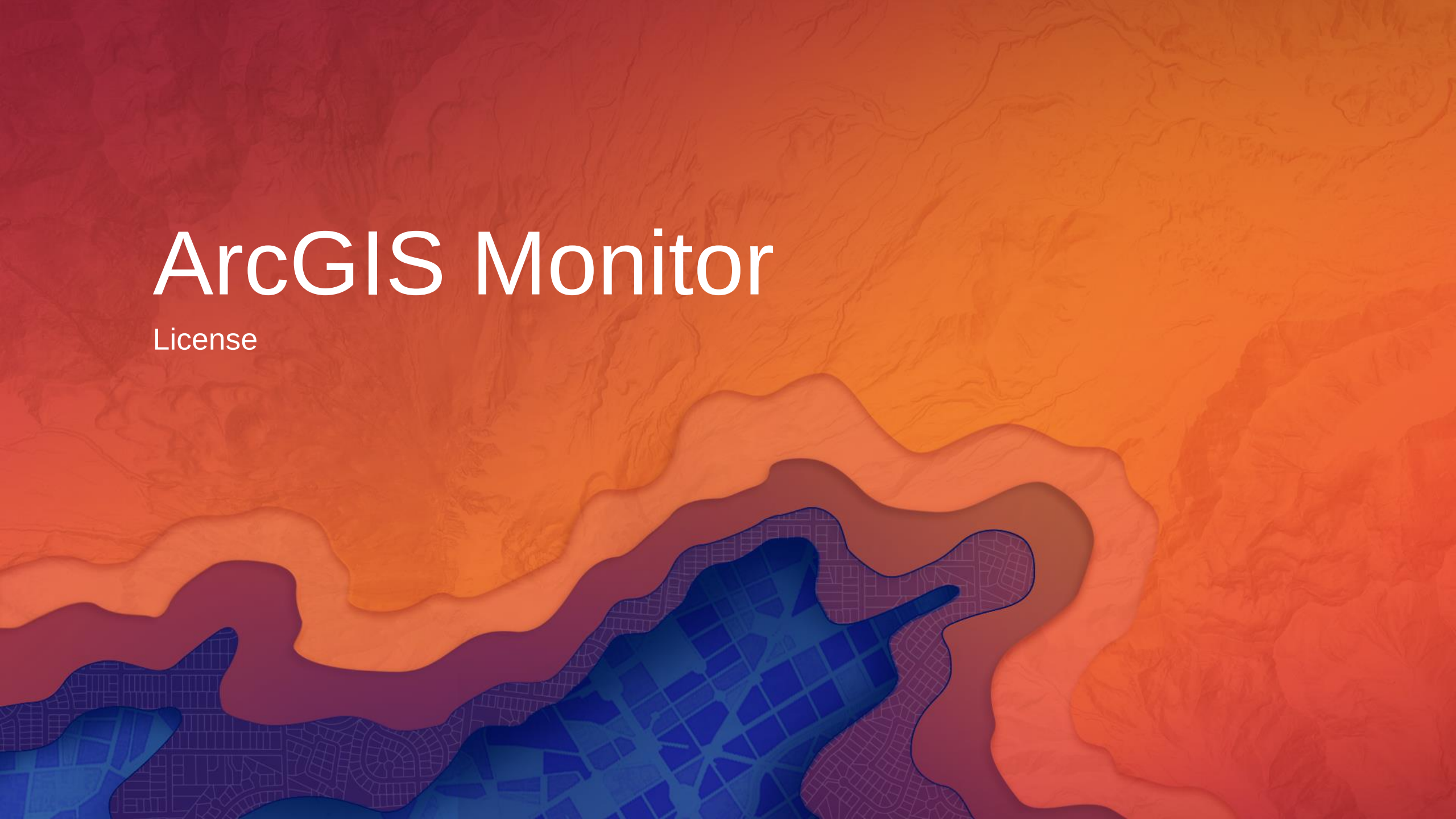


GeoInfo

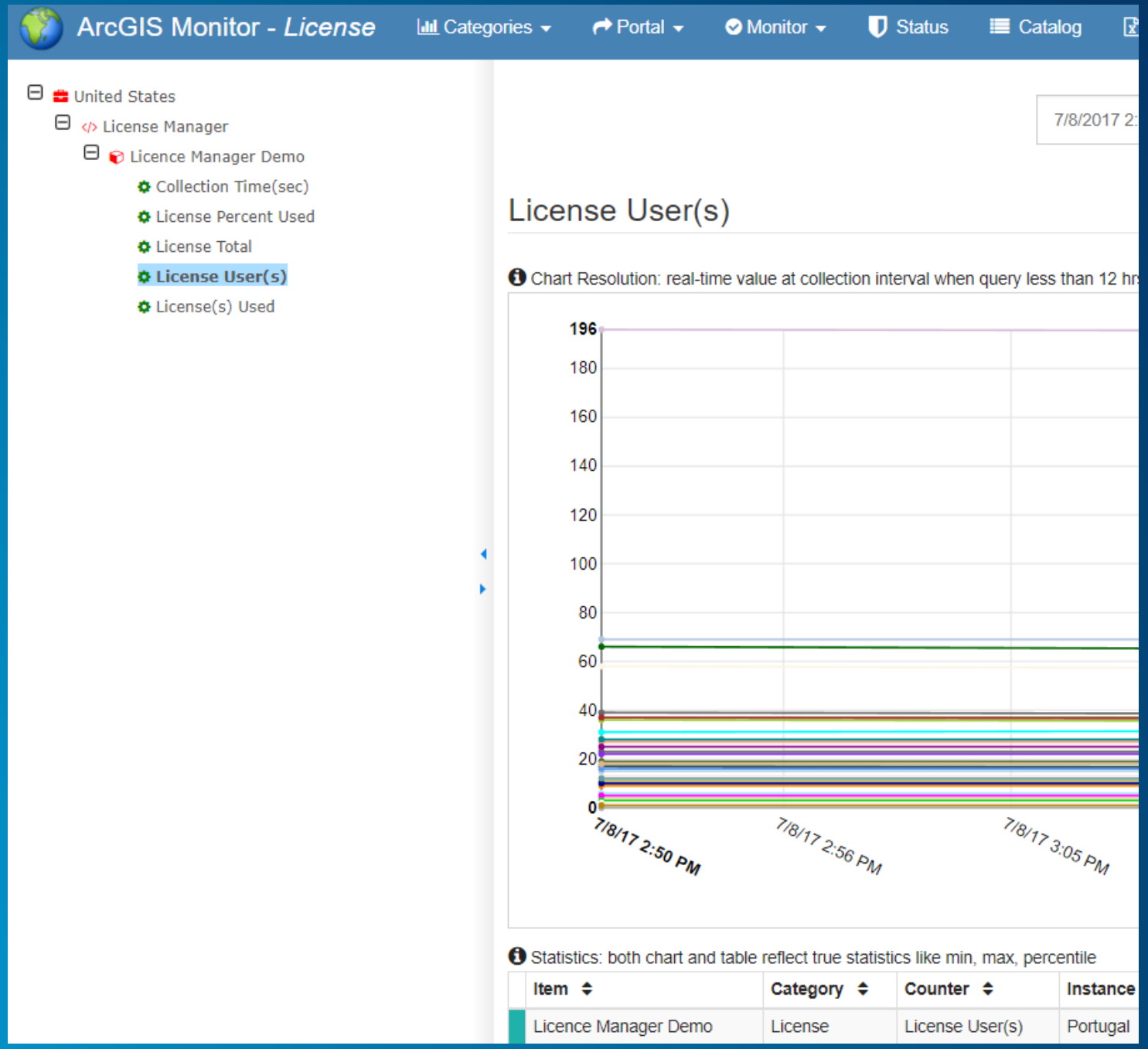

ArcGIS Monitor - GeoInfo
Categories
Portal
Monitor
Status
Catalog
Reports
esridemo@systemmonitoring-emcs.esri.com:443 / Logo
New York
ELB Logs
SLP-ELB
IP Location
United States
World
IIS Logs
Redlands
7/8/2017 6:37:56 PM
7/8/2017 10:37:56 PM
Go
<<
>>
Request - IP Location
IP Location
0 - 50
51 - 100
101 - 200
201 - 500
501 - 1k
1k - 2k
2k - 3k
3k - 5k
Default
GREENLAND
ARCTIC CIRCLE
EUROPE
ASIA
IPs - Unique IPs: 689 (table only shows top)
Totals: 40,583
Rank | % | IP | Country | Region
1 | 6.38% | 166.7.107.152 | United States | DC
2 | 2.91% | 121.244.174.3 | India |
3 | 2.84% | 184.166.188.196 | United States | MT
4 | 2.01% | 136.243.36.93 | Germany |
5 | 1.58% | 205.149.15.240 | UNKOWN | UNKOWN
6 | 1.53% | 12.24.3.71 | United States | IN

ArcGIS Monitor

License

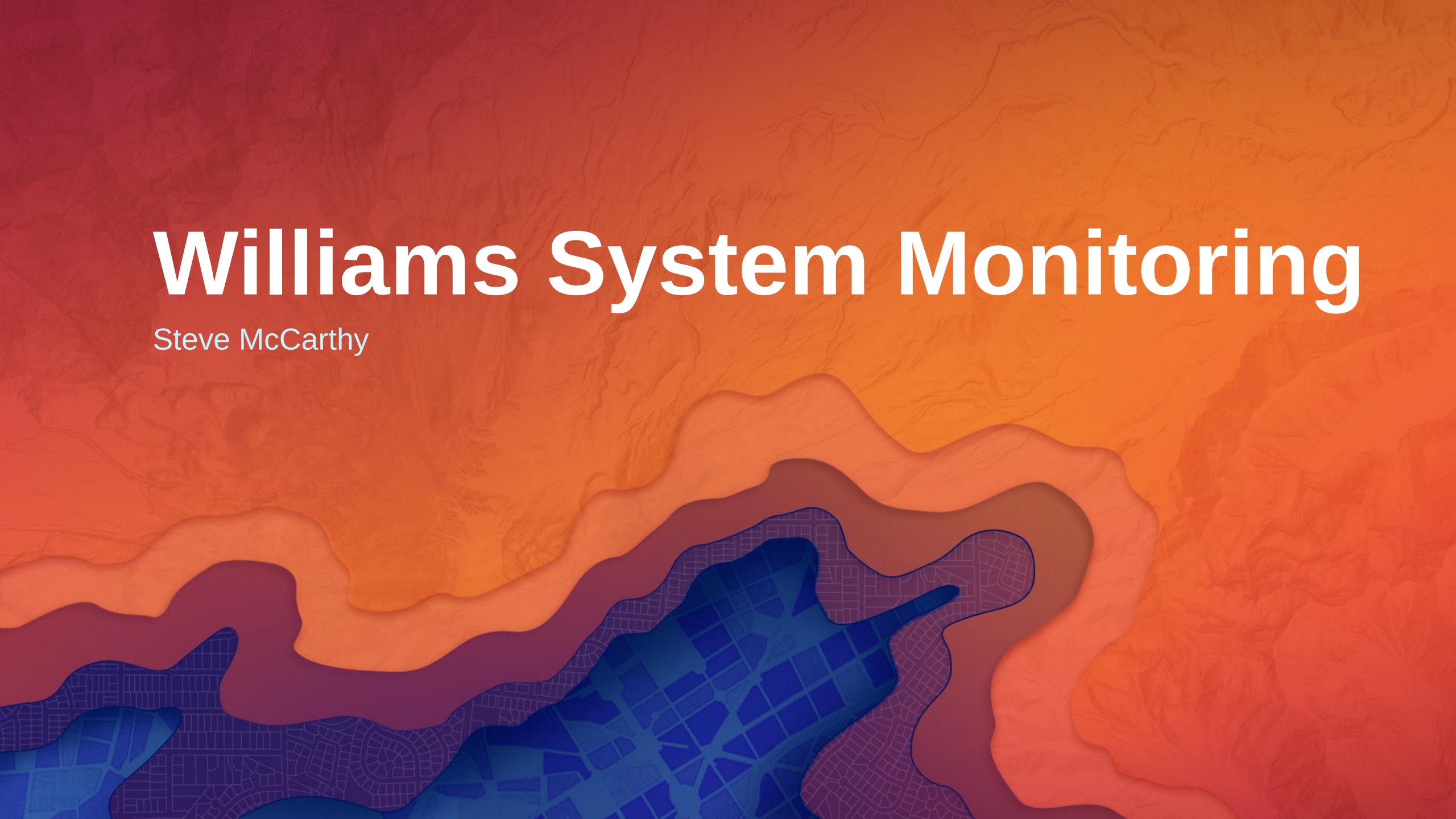


License (lmutil)



Williams System Monitoring

Steve McCarthy



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

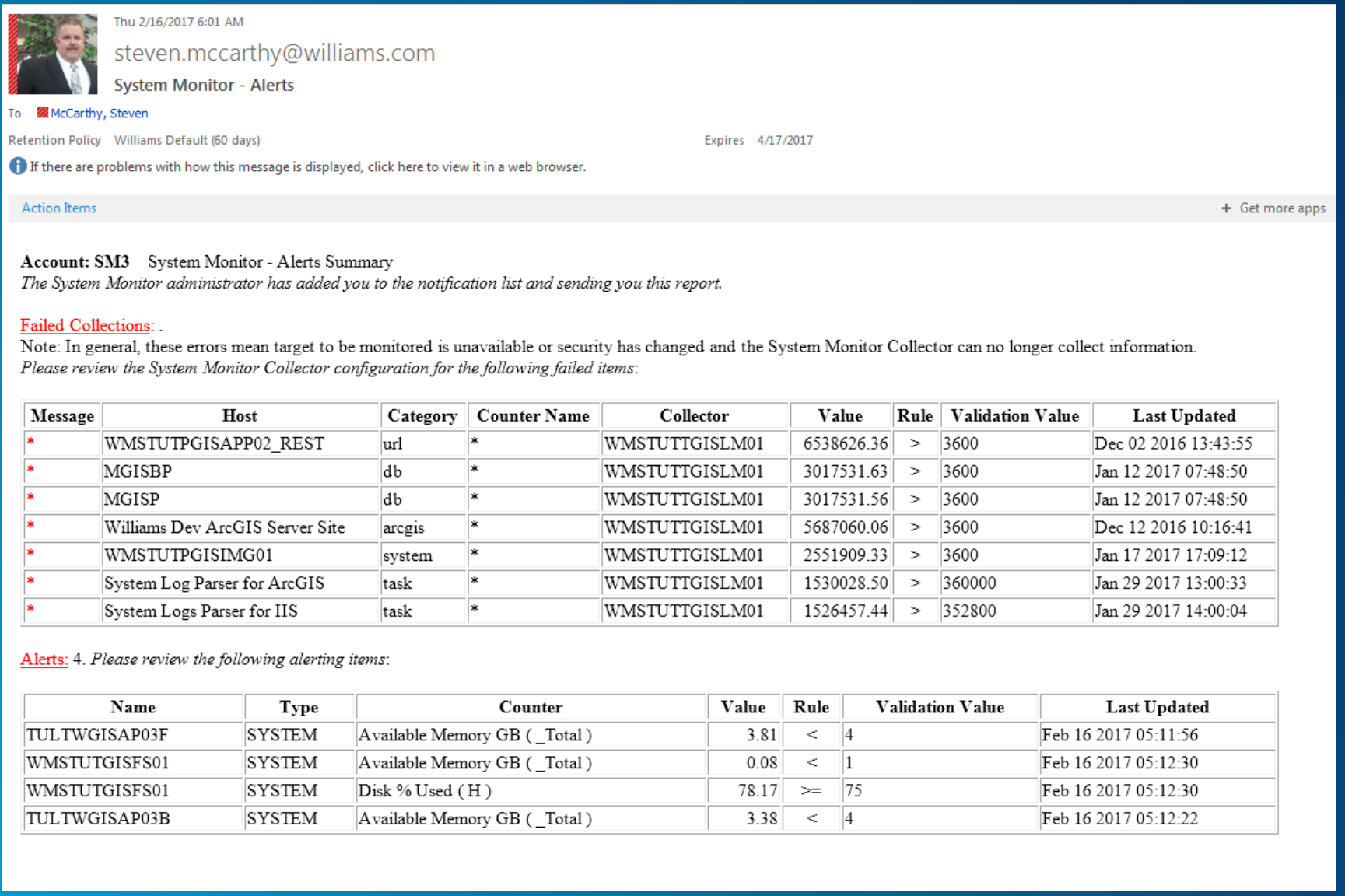
Report Summary

Category	Type	Name	Source	Time	Uptime	Performa	HighUtili	LowUtili	Alerts	Errors
Web Application	Requests	Response Time(sec)	Url	Timespan	●	▲			■	
Web Application	Requests	Response Time(sec)	Url	Hourly		▲			■	
Web Application	Errors	Count	Url	Hourly						■
ArcGIS	Site	Configuraton	AdminAPI	Last						
ArcGIS	Services	Summary	AdminAPI	Last						
ArcGIS	Requests	Count	AdminAPI	Timespan				▲		■
ArcGIS	Requests	Requests/sec	AdminAPI	Timespan			▲			
ArcGIS	Services	Requests/sec	AdminAPI	Hourly			▲			
ArcGIS	Services	Instances	AdminAPI	Timespan	●		■			
ArcGIS	Services	Response Time(sec)	AdminAPI	Timespan		■				
ArcGIS	Services	Response Time(sec)	AdminAPI	Hourly		■				
Extensions	Extensions	Extensions	Extensions	Timespan	●					
ArcGIS	License	Utilization(%)	Lmutil	Timespan				●		
ArcGIS	License	Users	Lmutil	Timespan						
ArcGIS	License	User Names	Lmutil	Timespan						
Web Application	Requests	Per IP	WebLogs	Timespan						
Web Application	Requests	Per Hour	WebLogs	Timespan						
Web Application	Requests	Count	WebLogs	Timespan						
Web Application	Requests	Response Time(sec)	WebLogs	Timespan		■				
System	Summary	Summary	AdminAPI	Last						
System	CPU	Utilization(%)	AdminAPI	Timespan	●		▲	●	■	
System	CPU	Utilization(%)	AdminAPI	Hourly			▲	●	■	
System	Memory Physical	Utilization(%)	AdminAPI	Timespan	●		■			
System	Memory Physical	Utilization(%)	AdminAPI	Hourly			■	●		
System	Memory Virtual	Utilization(%)	AdminAPI	Timespan	●		■	●		
System	Memory Virtual	Utilization(%)	AdminAPI	Hourly			■	●		
System	Disk Utilization	Utilization(%)	AdminAPI	Timespan	●		■			
System	Disk Utilization	Utilization(%)	AdminAPI	Hourly			■	●		
System	Disk Space	Utilization(%)	AdminAPI	Timespan	●		■	●		
System	Network Receive	mbps	AdminAPI	Timespan	●		▲			
System	Network Receive	mbps	AdminAPI	Hourly			▲			
System	Network Sent	mbps	AdminAPI	Timespan	●		▲			
System	Network Sent	mbps	AdminAPI	Hourly			▲	●		
System	Process CPU	Utilization(%)	AdminAPI	Timespan	●					
System	Process Memory	Utilization(%)	AdminAPI	Timespan	●		▲			
System	Process Memory	Utilization(%)	AdminAPI	Timespan	●		▲			
System	Process Count	Count	AdminAPI	Timespan	●					
System	Process Count	Active	AdminAPI	Timespan	●					
Database	DB query	DB query	DB query	Timespan	●					
System Monitor	Collection Time	Utilization(%)	AdminAPI	Timespan	●			●		

ESRI System Monitoring Tools Used

Environment Overview

- System Monitor 3
  - Alerts



Thu 2/16/2017 6:01 AM

steven.mccarthy@williams.com

System Monitor - Alerts

To McCarthy, Steven

Retention Policy Williams Default (60 days) Expires 4/17/2017

If there are problems with how this message is displayed, click here to view it in a web browser.

Action Items + Get more apps

Account: SM3 System Monitor - Alerts Summary

The System Monitor administrator has added you to the notification list and sending you this report.

Failed Collections: .

Note: In general, these errors mean target to be monitored 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:

Message	Host	Category	Counter Name	Collector	Value	Rule	Validation Value	Last Updated
*	WMSTUTPGISAPP02_REST	url	*	WMSTUTTGISLM01	6538626.36	>	3600	Dec 02 2016 13:43:55
*	MGISBP	db	*	WMSTUTTGISLM01	3017531.63	>	3600	Jan 12 2017 07:48:50
*	MGISP	db	*	WMSTUTTGISLM01	3017531.56	>	3600	Jan 12 2017 07:48:50
*	Williams Dev ArcGIS Server Site	arcgis	*	WMSTUTTGISLM01	5687060.06	>	3600	Dec 12 2016 10:16:41
*	WMSTUTPGISIMG01	system	*	WMSTUTTGISLM01	2551909.33	>	3600	Jan 17 2017 17:09:12
*	System Log Parser for ArcGIS	task	*	WMSTUTTGISLM01	1530028.50	>	360000	Jan 29 2017 13:00:33
*	System Logs Parser for IIS	task	*	WMSTUTTGISLM01	1526457.44	>	352800	Jan 29 2017 14:00:04

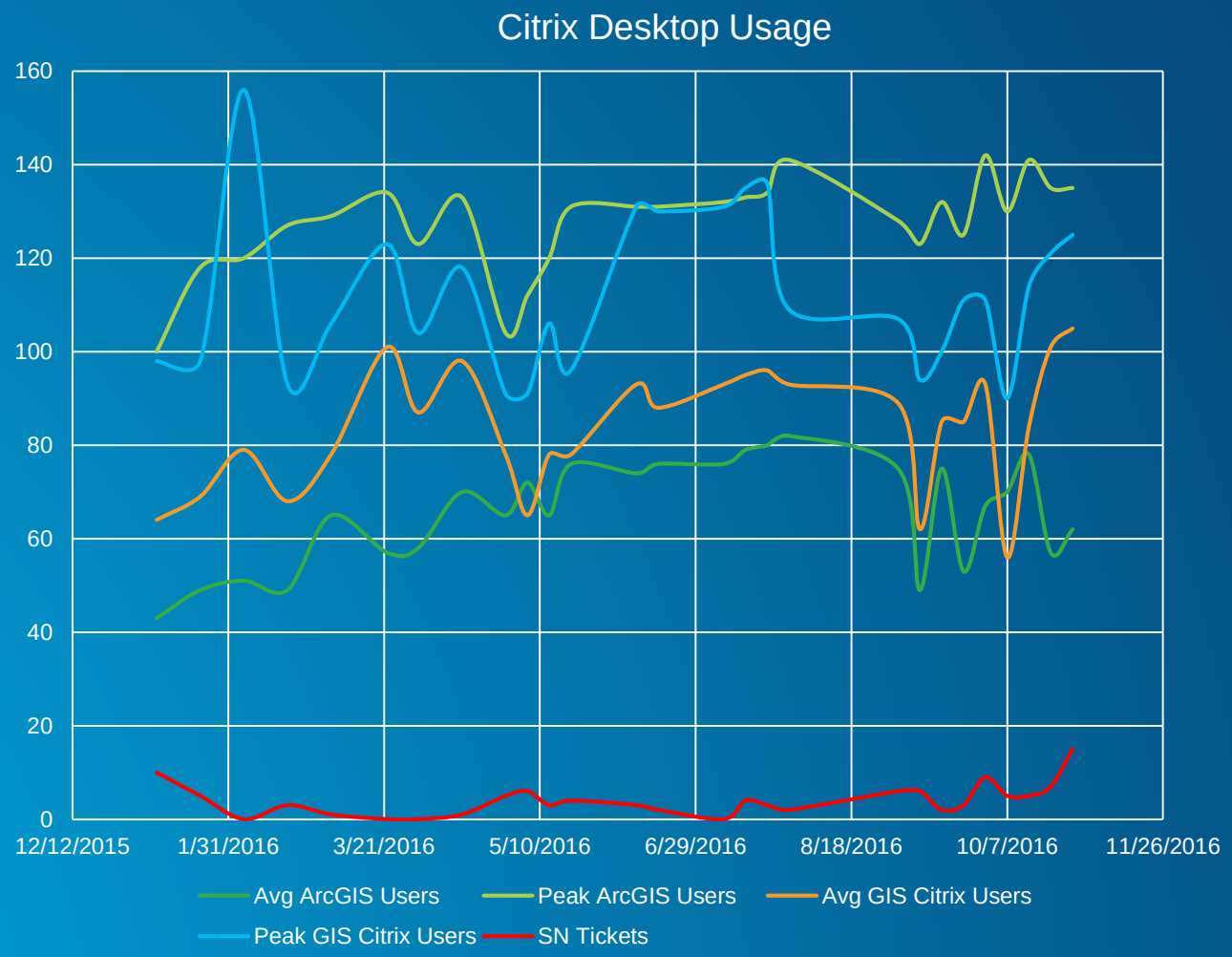
Alerts: 4. *Please review the following alerting items*:

Name	Type	Counter	Value	Rule	Validation Value	Last Updated
TULTWGISAP03F	SYSTEM	Available Memory GB (_Total)	3.81	<	4	Feb 16 2017 05:11:56
WMSTUTGISFS01	SYSTEM	Available Memory GB (_Total)	0.08	<	1	Feb 16 2017 05:12:30
WMSTUTGISFS01	SYSTEM	Disk % Used (H)	78.17	>=	75	Feb 16 2017 05:12:30
TULTWGISAP03B	SYSTEM	Available Memory GB (_Total)	3.38	<	4	Feb 16 2017 05:12:22

ESRI System Monitoring Tools Used

Environment Overview

- **System Monitor 3**
  - **Reports**



ESRI System Monitoring Tools Used

System Monitor 3

- **System Log Parser (ArcGIS & Web)**

System Log Parser Analysis Report

Report Created	2/13/2017 10:05:51 AM
Analysis Type	Complete
Server Host	s://tulpwgisap03b.williams.com:6443/arcgis
Server Version (Build)	10.2.2 (3552)
Server LogLevel (FileAge)	FINE (90)
Log Inquiry User	arcgis
Start Time	2017-02-12T10:05:00,392
End Time	2017-02-13T10:05:00,392
Total Services Method Items Discovered	20,844
Total Requested Services	53
Total Inquiry Time	22.99 seconds
Total Number of Log Inquiry Calls	259
Average Log Inquiry Time	0.09 seconds
Average Log Inquiry Size	11,514 Bytes

Warnings and Errors

What is the "Warnings and Errors" table?
The "Warnings and Errors" table helps summarize and quantify warning and error messages found in the logs so administrators can more easily see potential issues.

Totals

Severe	Warning
10	90

Counts

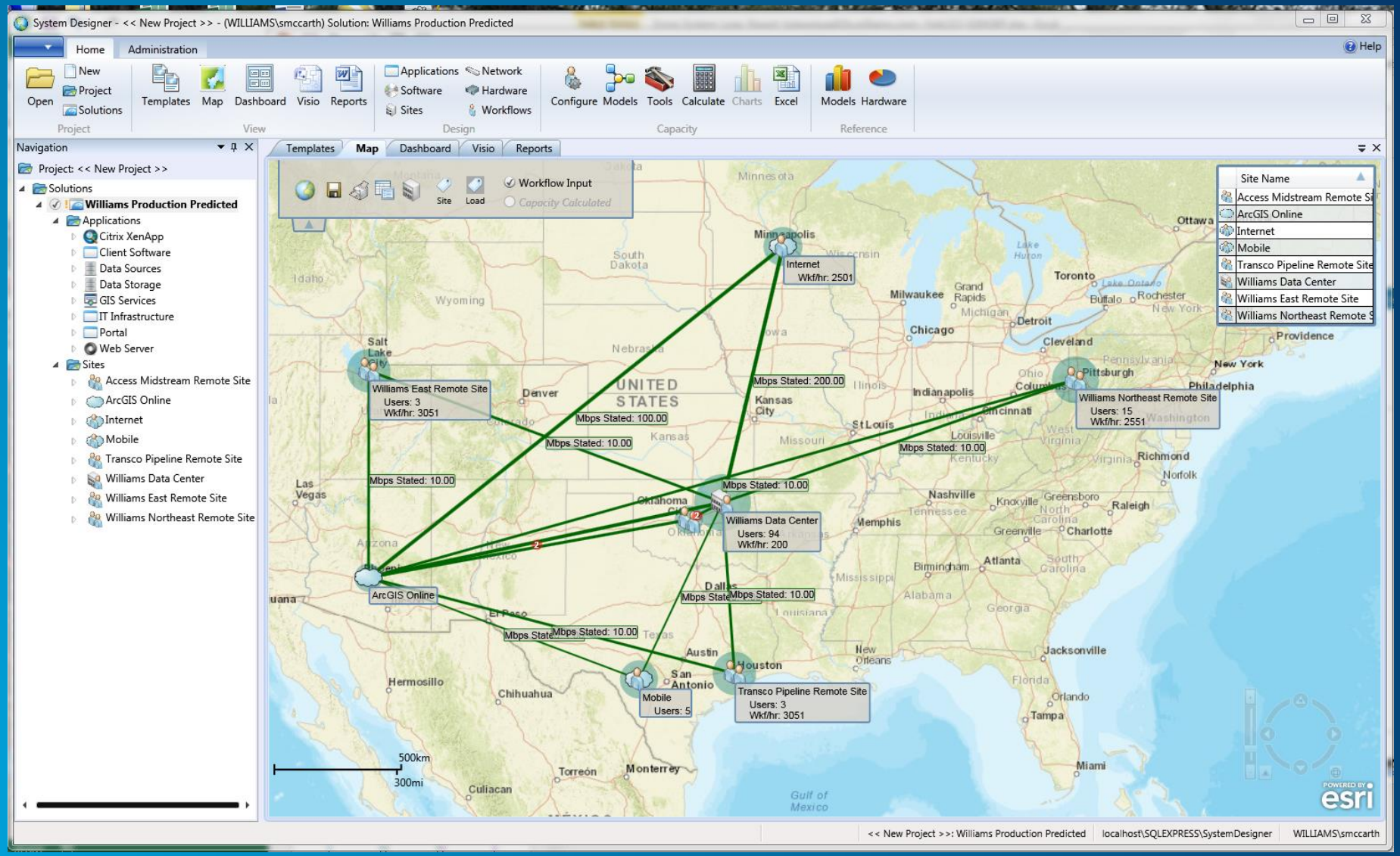
Count	Type	Code	Machine	Source	Message
20	WARNING	6974	TULPWGISAP03C.WILLIAMS.COM	Admin	Failed to log in. Invalid username or password specified.
19	WARNING	6974	TULPWGISAP03A.WILLIAMS.COM	Admin	Failed to log in. Invalid username or password specified.
19	WARNING	6974	TULPWGISAP03B.WILLIAMS.COM	Admin	Failed to log in. Invalid username or password specified.
18	WARNING	6974	TULPWGISAP03D.WILLIAMS.COM	Admin	Failed to log in. Invalid username or password specified.
14	WARNING	6974	TULPWGISAP03E.WILLIAMS.COM	Admin	Failed to log in. Invalid username or password specified.
2	SEVERE	20010	TULPWGISAP03D.WILLIAMS.COM	Utilities/PrintingTools.GPServer	https://gisgateway.williams.com/arcgis/rest/services/Ho
2	SEVERE	20010	TULPWGISAP03D.WILLIAMS.COM	Utilities/PrintingTools.GPServer	Error executing tool.: Layer "Route Development Layers_
1	SEVERE	20010	TULPWGISAP03E.WILLIAMS.COM	Surface/Profile.GPServer	Error executing tool.
1	SEVERE	20010	TULPWGISAP03E.WILLIAMS.COM	Surface/Profile.GPServer	The specified sample distance results in more vertices th
1	SEVERE	20010	TULPWGISAP03E.WILLIAMS.COM	Utilities/PrintingTools.GPServer	https://gisgateway.williams.com/arcgis/rest/services/Ho
1	SEVERE	20010	TULPWGISAP03E.WILLIAMS.COM	Utilities/PrintingTools.GPServer	https://gisgateway.williams.com/arcgis/rest/services/Ho
1	SEVERE	10849	TULPWGISAP03C.WILLIAMS.COM	ToolBar_WEB/Pipeline_Features.MapServer	An invalid where clause or definition expression has bee
1	SEVERE	8000	TULPWGISAP03C.WILLIAMS.COM	UDS/UDS_Transco_Albers_Base.MapServer	SOE custom error: Field not found in layer.

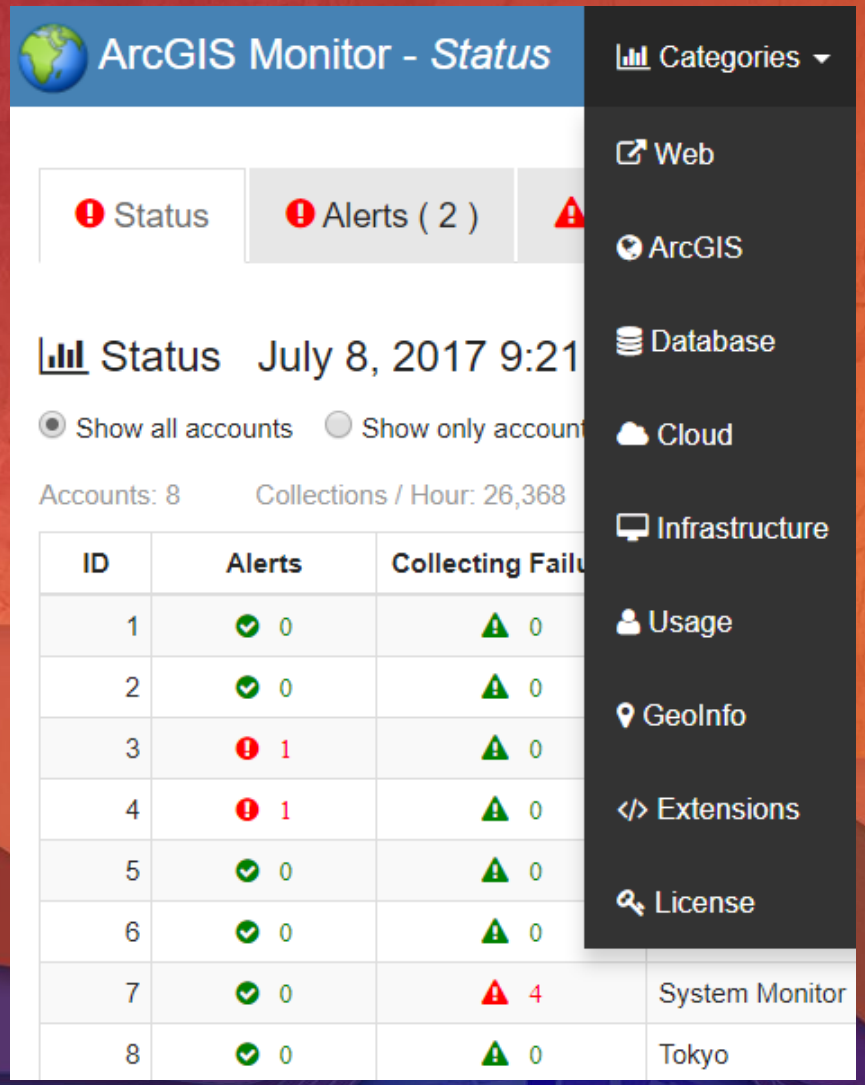
Usage and Performance: ArcSOC request counts and elapsed times (sec)

Service/Source	Method	Machine	Username	Count	Count	Avg	Min	P5	P25	P50	P75	P95	P99	Max	Stdev	Sum	Sum Pct
ROW|RIGHT_OF_WAY_MAV.MapServer	/export	TULPWGISAP03A.WILLIAMS.COM	WILLIAMS\svc_ArcGISweb	290	1.00%	0.546	0.015	0.062	0.099	0.152	0.344	1.450	9.462	16.993	1.645	158.229	1.00%
ROW|RIGHT_OF_WAY_MAV.MapServer	/export	TULPWGISAP03B.WILLIAMS.COM	WILLIAMS\svc_ArcGISweb	256	1.00%	0.467	0.028	0.048	0.078	0.115	0.354	1.644	7.480	16.013	1.347	119.534	1.00%
ROW|RIGHT_OF_WAY_MAV.MapServer	/identify	TULPWGISAP03A.WILLIAMS.COM	WILLIAMS\svc_ArcGISweb	16	0.00%	0.150	0.022	0.022	0.028	0.054	0.072	1.532	1.532	1.532	0.358	2.399	0.00%
ROW|RIGHT_OF_WAY_MAV.MapServer	/identify	TULPWGISAP03B.WILLIAMS.COM	WILLIAMS\svc_ArcGISweb	13	0.00%	0.045	0.012	0.012	0.022	0.047	0.059	0.089	0.089	0.089	0.024	0.589	0.00%
ROW|RIGHT_OF_WAY_MAV.MapServer	/find	TULPWGISAP03A.WILLIAMS.COM	WILLIAMS\svc_ArcGISweb	8	0.00%	9.131	6.140	6.140	6.554	8.925	9.980	13.364	13.364	13.364	2.166	73.052	0.00%
ROW|RIGHT_OF_WAY_MAV.MapServer	/find	TULPWGISAP03B.WILLIAMS.COM	WILLIAMS\svc_ArcGISweb	7	0.00%	8.348	6.834	6.834	6.939	7.828	10.037	10.796	10.796	10.796	1.424	58.435	0.00%

ESRI System Monitoring Tools Used

System Designer





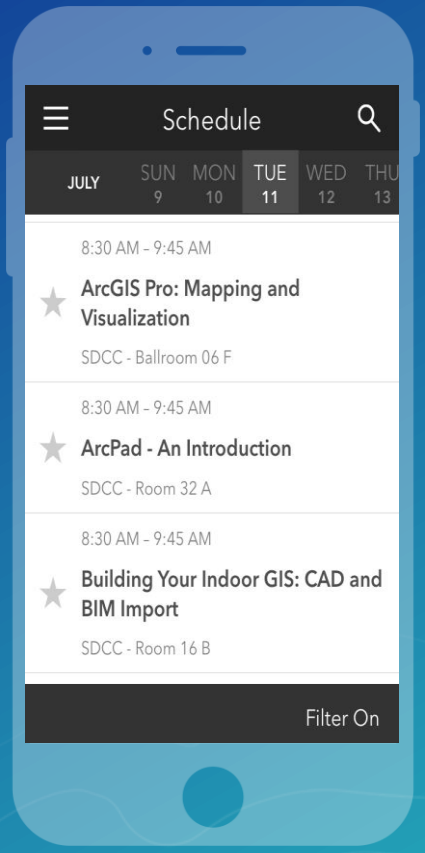
ArcGIS Monitor

https://systemmonitoring-emcs.esri.com

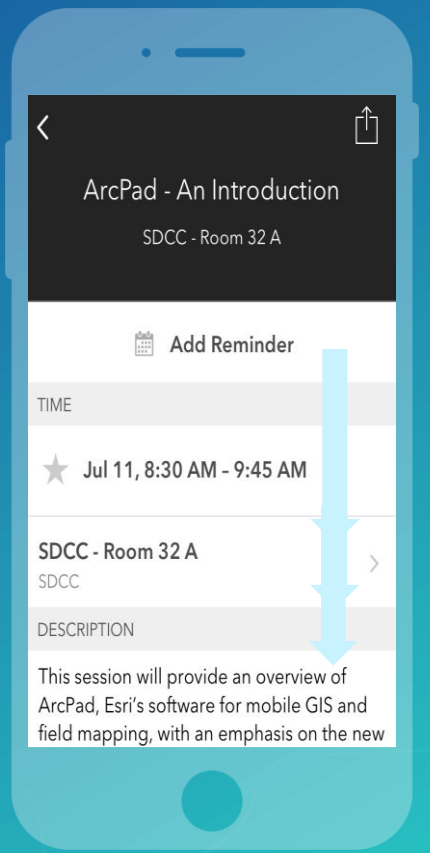
Please Take Our Survey on the **Esri Events App!**

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"