



Enterprise Architectures for Large Tiled Basemap Projects

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- **Esri Professional Services – Washington D.C Regional Office**
- **Project Technical Lead:**
 - Responsible for maintenance of 16+ Basemaps
 - 40+ TB of cache data
- **Caching large Basemaps since 2008**
- **Certifications:**
 - Esri Enterprise System Design Associate
 - CompTIA Security+ ce

Topics

- **What's new for caching at 10.3 / 10.3.1**
- **Architecture Patterns**
- **Supporting The Enterprise**
- **Caching Mechanics**
- **Optimizing The Caching Process**

Supporting Sessions / Workshops

- **Designing and Using Cached Map Services (2 offerings)**
- **Caching Imagery using ArcGIS (1 offering)**
- **Best Practices for Designing Effective Map Services (2 offerings)**
- **Introduction to CacheWorx (1 offering)**
- **ArcGIS for Server: An Introduction (2 offerings)**
- **ArcGIS Server Performance and Scalability: Optimizing GIS Services (2 offerings)**
- **Enterprise GIS: Performance and Scalability (2 offerings)**
- **Road Ahead for Vector Mapping (1 offering)**

25%

Cache smarter...not harder

50%

Cache smarter...not harder

75%

Cache smarter...not harder

1 Million

Tiles Per Minute

Cache Generation Throughput

$R^2 = 0.9969$

Tiles: JPEG 75 @ 256x256
Test: 1:147M – 1:9K
Continental U.S. AOI
2677 Bundles, 42,831,784 Tiles
Bare Metal Server:
Windows 2008R2 SP1
32 cores, 500GB hdd, 256GB RAM
1 – 16 servers (32 – 512 cores)

Tiles Per Minute

1,500,000
1,400,000
1,300,000
1,200,000
1,100,000
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000

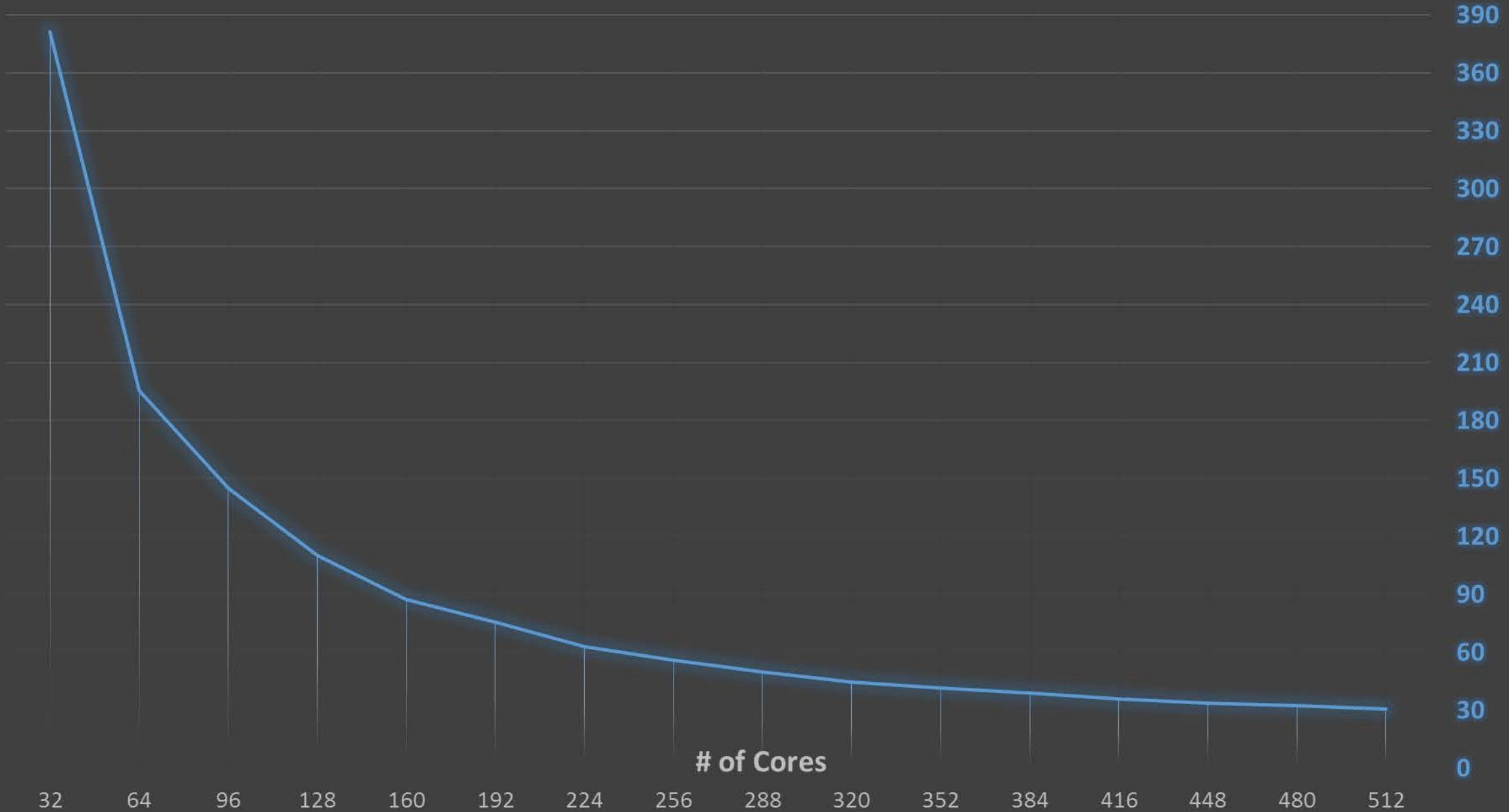


of Cores

32 64 96 128 160 192 224 256 288 320 352 384 416 448 480 512

Cache Generation Throughput

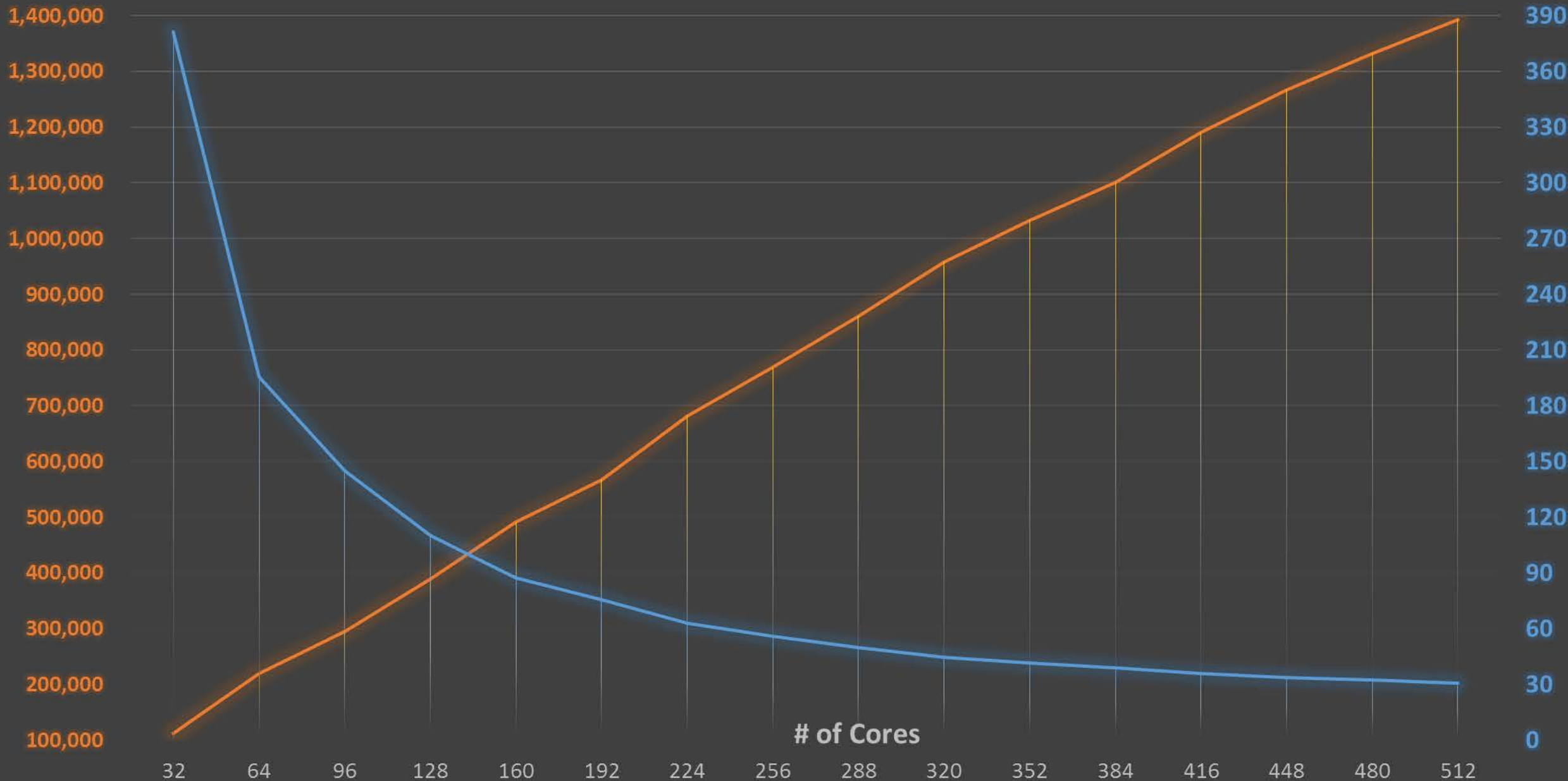
Generation Time
(in Minutes)



Cache Generation Throughput

Generation Time
(in Minutes)

Tiles Per Minute



Scalable

Cache smarter...not harder

What's new for caching at 10.3 and 10.3.1?

- Performance improvements when consuming cached map and image services.
- Improved performance when accessing tiles under heavy load or when your cache directory is on a network location.
- Updated cache file format:
 - Bundle and Bundlx in a single .bundle file
 - Requires 10.3 or 10.3.1 to host upgraded cache files
 - Older cache files supported and upgradable (in place)
- Performance improvements for secured cached map and image services.
- OGC – WMTS service performance improvements.
- Monitor server statistics using ArcGIS Server Manager.
- 3D Scene Services now available.
- New Limited Error Raster Compression (LERC) tile format.

The background features a vibrant blue gradient. On the left side, there are several overlapping geometric shapes: a large purple triangle pointing upwards, a yellow triangle pointing downwards, and a dark purple triangle pointing downwards. These shapes are layered, creating a sense of depth. The text 'Architecture Patterns' is centered in the upper half of the image in a white, bold, sans-serif font.

Architecture Patterns

On-Premises



SaaS
(Hosted by Esri)



On-Premises
(Your infrastructure)



Hybrid

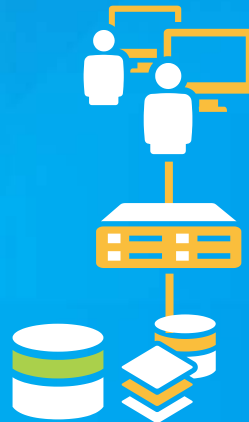
Cache smarter...not harder



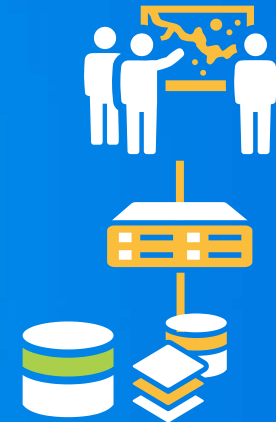
Dedicated Cooking Rig Pattern



Development



Staging

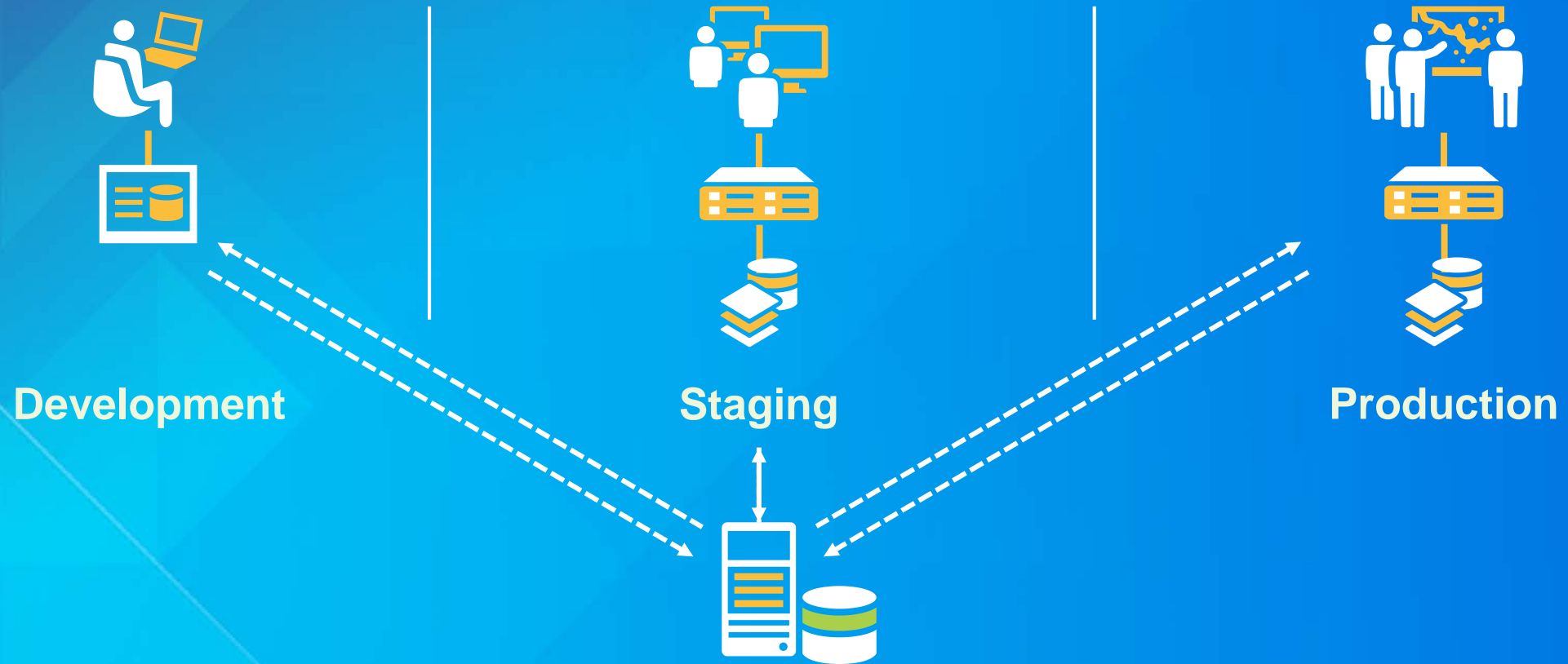


Production

Cache smarter...not harder



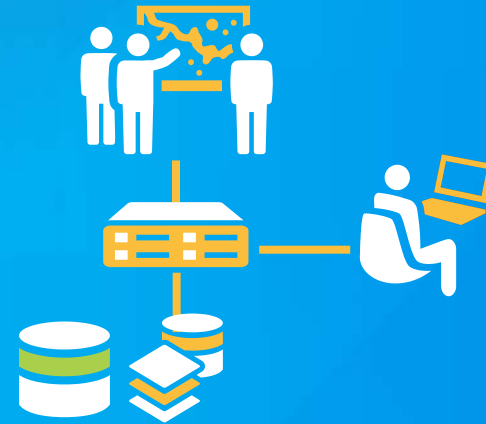
Dedicated Cooking Rig, Shared Cache Pattern



Cache smarter...not harder



Cooking in Production



Editing: [Site \(root\)](#) > [System](#) > CachingTools [Help](#) [Save and Restart](#) [Cancel](#)

General
Parameters
Capabilities
Pooling
Processes
Test Description

Specify Number of Instances

Minimum number of instances per machine:

Maximum number of instances per machine:

Specify Service Timeouts

The maximum time a client can use a service: seconds

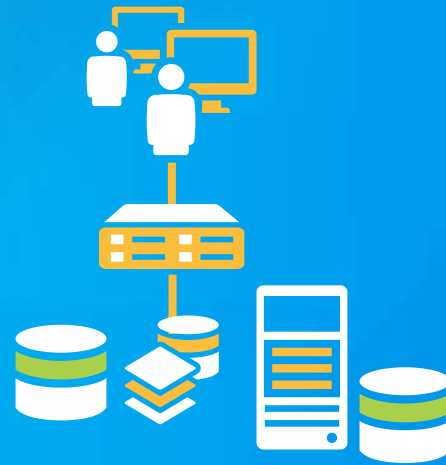
Cache smarter...not harder



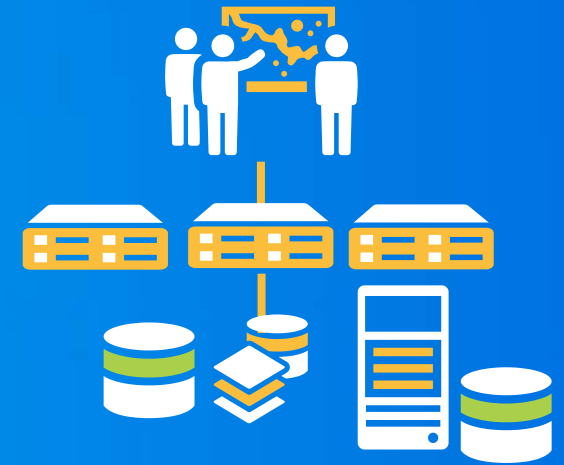
My Environment



Development



Staging

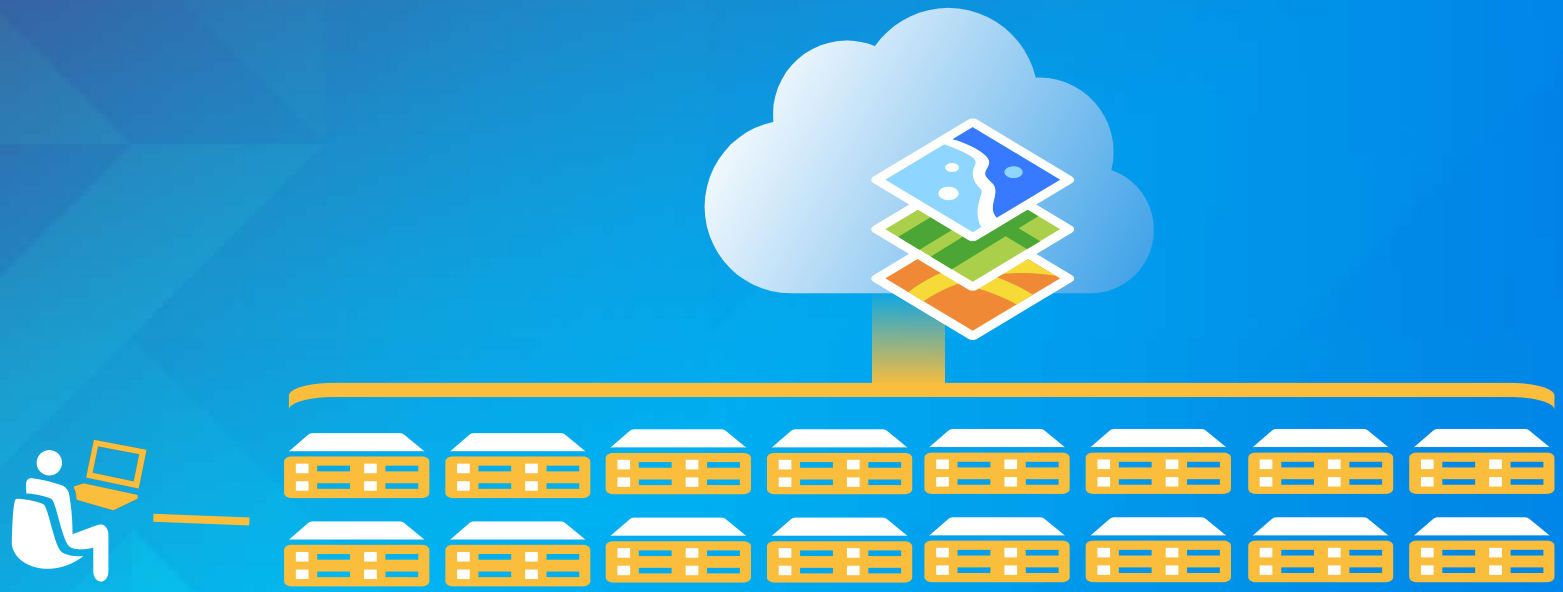


Production

Cache smarter...not harder



My Development Environment



Cache



Data







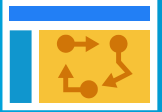

Config-Store
Directories

The background features a vibrant blue gradient. On the left side, there are several overlapping geometric shapes: a large purple triangle pointing upwards, a yellow triangle pointing downwards, and a dark purple triangle pointing downwards. These shapes are layered, creating a sense of depth. The text 'Supporting The Enterprise' is centered in the white space on the right.

Supporting The Enterprise

On-Premises



-  Map Services
-  Image Services
-  Elevation Services
-  3D Scene Services
-  Routing / Analysis Services
-  Locators / Place Finding Services



Cache smarter...not harder

The background features a vibrant blue gradient. On the left side, there are several overlapping geometric shapes: a large purple triangle pointing upwards, a yellow triangle pointing downwards, and a dark purple triangle pointing downwards. The yellow triangle contains a faint, light-colored grid pattern.

Caching Mechanics

Airline Ticketing and Baggage Check

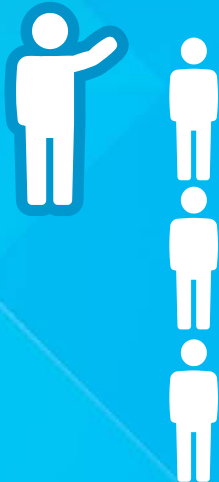
Your Favorite Airline

Ticketing Manager



Ticket Kiosks

Greeter



Travelers

Cache smarter...not harder

Your ArcGIS Server

Your Site

ArcGIS Server



Caching Tools
(instances)

Caching
Controller

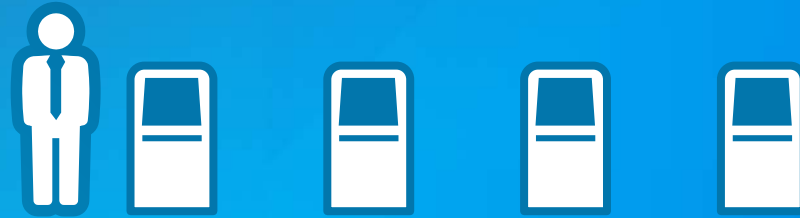


Job Queue

Cache smarter...not harder

How do we increase throughput?

Your Favorite Airline



Cache smarter...not harder

Connect The Dots For Me...

- **Add more kiosks:**
 - Increase the number of available resources to process cache jobs
- **Add a second queue / better queue management:**
 - Improve the tasking of those resources
- **More efficient travelers:**
 - Improve the time it takes to process those cache jobs

Compact Cache and Bundles

- **Bundles are files that contain our generated tiles**
 - 128 tiles x 128 tiles = 16,384 tiles in a full bundle
- **Unit of work for server**
 - Each instances or SOC works on 1 bundle at a time
- **Not a zip file**
- **More efficient use of disk space**
- **More efficient for file transfer**



Optimizing The Caching Process

Road Map...

- Optimize your environment
- Optimize your data
- Optimize your ArcGIS Server
- Optimize your MXD
- Optimize your Raster Basemap Projects
- Optimize cache jobs



Cache smarter...not harder

Optimize Your Environment

Testing

- **Performance measures: Tiles / Minute**
- **Basic MXD**
- **Maximize throughput of basic service**
 - **Modify one parameter at a time**
 - **Source Data**
 - **Number of instances**
 - **Cache location**
 - **Config Store / Directories location**
- **Test with a representative service**
 - **Vector / Raster**
 - **PNG, Mixed, JPEG**

Cache smarter...not harder

Optimize Your Environment

Monitor

- **Maximum busy instances during cache job**
- **Time to complete the job**
- **Size of the cache**
- **Number of Tiles**
- **CPU Utilization of host machines**

Monitor - Peak Instances

<http://mysite:6080/arcgis/admin>

ArcGIS Server Administrator Directory Logged in: admin [Administrator] | [Signout](#)

[Home](#) > [services](#) > [System](#) > [CachingTools.GPServer](#) > [statistics](#) [API Reference](#)

Service Statistics - CachingTools (GPServer)

Summary

Busy instances:	0
Free instances:	512
Initializing instances:	0
Not created instances:	0
Maximum instances:	512
Number of transactions:	512
Total busy time (in milliseconds):	24119092

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Monitor - Peak Instances

<http://mysite:6080/arcgis/manager>

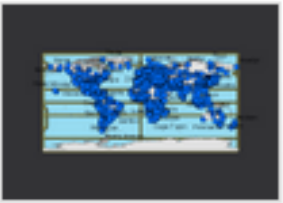
The screenshot displays the ArcGIS Server Manager interface. At the top, there are navigation tabs for 'Services', 'Site', 'Security', and 'Logs'. Below these, there are sub-tabs for 'Manage Services', 'OGC Services', 'KML Network Links', and 'Sharing'. The main area is titled 'Folders' and contains a search bar with the text '< Search for services in System >'. On the left, a tree view shows the 'Site (root)' folder containing a 'Basemap' folder and several other sub-folders. The main content area displays two service cards, each with a red toolbox icon. The first card is for 'CachingControllers' (Geoprocessing Service), which is 'Started' and has 16 instances running, 0 instances in use, and a maximum of 32 instances. The second card is for 'CachingTools' (Geoprocessing Service), which is also 'Started' but has 512 instances running, 0 instances in use, and a maximum of 512 instances. Each card includes a description, status, and instance counts, along with control icons for user, lock, play, stop, and close.

Service Name	Type	Status	Instances Running	Instances in Use	Maximum Instances
CachingControllers	Geoprocessing Service	Started	16	0	32
CachingTools	Geoprocessing Service	Started	512	0	512

Cache smarter...not harder

Monitor - Number Of Tiles

<http://mysite:6080/arcgis/manager>



Test Compressed (Map Service)

Test

Status: Started

Instances Running: 16

Instances in Use: 0


Maximum Instances: 32

Cache Status

Cache Status: Test_Compressed (MapServer)

0.01% of the tiles are available for this service.

Tile generation is in progress.

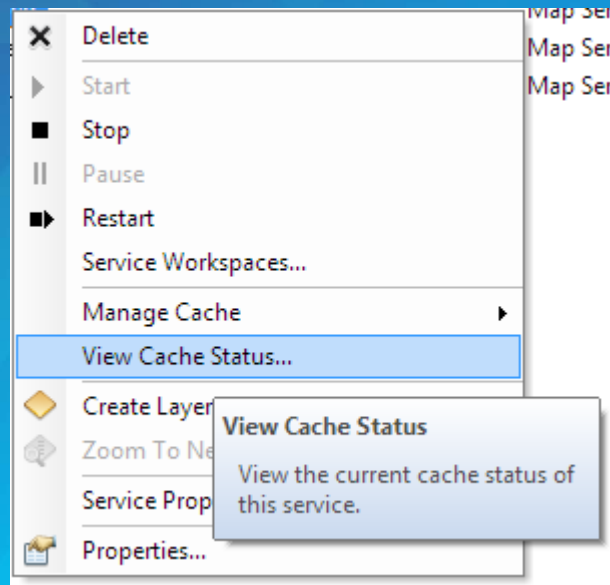
Level	Scale	Size	Expected Tiles	Completed Tiles	Percent	In Progress
No status information was returned. This service might not be cached.						
0	147,748,799.29	0.15 MB	8	8	100	
1	73,874,399.64	0.38 MB	32	32	100	
2	36,937,199.82	0.89 MB	128	128	100	
3	18,468,599.91	1.15 MB	512	256	50	
4	9,234,299.96	1.94 MB	2,048	512	25	
5	4,617,149.98	3.44 MB	8,192	1,024	12.5	
6	2,308,574.99	5.78 MB	32,768	2,048	6.25	
7	1,154,287.49	11.78 MB	131,072	4,608	3.52	
8	577,143.75	27.37 MB	524,288	11,264	2.15	
9	288,571.87	87.28 MB	2,097,152	36,864	1.76	
10	144,285.94	293.01 MB	8,388,608	125,440	1.5	
11	72,142.97	1.14 GB	33,554,432	501,760	1.5	
12	36,071.48	4.54 GB	134,217,728	2,007,040	1.5	
13	18,035.74	18.12 GB	536,870,912	8,028,160	1.5	
14	9,017.87	17.4 GB	2,147,483,648	7,716,864	0.36	
15	4,508.94	0 MB	8,589,934,592	0	0	
16	2,254.47	0 MB	34,359,738,368	0	0	
17	1,127.23	0 MB	137,438,953,472	0	0	

[Hide Details](#) [Close](#)

Cache smarter...not harder

Monitor - Number Of Tiles

ArcGIS Desktop



The screenshot shows the 'Cache Status --- Test_Compressed' dialog box. The summary indicates that 0.0% of the tiles are present and that tile generation is in progress. The dialog has two tabs: 'Cache Status' and 'Job Status'. The 'Cache Status' tab is active, displaying a table with the following data:

Level	Scales	Size	Expected Tiles	Completed Tiles	Percent (%)	In Progress
0	147,748,799.285417	0.15 MB	8	8	100.0	
1	73,874,399.642709	0.38 MB	32	32	100.0	
2	36,937,199.821354	0.89 MB	128	128	100.0	
3	18,468,599.910677	1.15 MB	512	256	50.0	
4	9,234,299.955339	1.94 MB	2,048	512	25.0	
5	4,617,149.977669	3.44 MB	8,192	1,024	12.5	
6	2,308,574.988835	5.78 MB	32,768	2,048	6.3	
7	1,154,287.494417	11.78 MB	131,072	4,608	3.5	
8	577,143.747209	27.37 MB	524,288	11,264	2.1	
9	288,571.873604	87.28 MB	2,097,152	36,864	1.8	
10	144,285.936802	293.01 MB	8,388,608	125,440	1.5	
11	72,142.968401	1.14 GB	33,554,432	501,760	1.5	
12	36,071.484201	4.54 GB	134,217,728	2,007,040	1.5	
13	18,035.7421	18.12 GB	536,870,912	8,028,160	1.5	
14	9,017.87105	22.45 GB	2,147,483,648	9,961,472	0.5	Yes
15	4,508.935525	0.00 MB	8,589,934,592	0	0.0	
16	2,254.467763	0.00 MB	34,359,738,368	0	0.0	
17	1,127.233881	0.00 MB	137,438,953,472	0	0.0	

At the bottom of the dialog, there are four buttons: 'Refresh Status', 'Cancel Caching', 'Hide Details', and 'Close'.

Cache smarter...not harder

Optimize Your Environment

Configuration Considerations

- **Hardware:**

- **Network:**

- Multi-machine sites need a shared network file server location for directories and config store
- Ensure there are no switch or router bottlenecks (1GB switch to 100MB hub to 1GB switch)
- Consider NIC teaming to increase bandwidth

- **Server Local Disk:**

- RAID / Fault tolerance; but also anticipate high disk IO (reads and writes)
- RAID 5 (parity): fast reads, slow writes, fault tolerant – System, Data, Cache
- RAID 1 (mirroring): fast reads, good writes, fault tolerant – System, Data
- RAID 0 (striping): fast reads / writes, not fault tolerant – Temp Cache
- RAID 10 (mirror + striping): fast reads, good writes, larger disk investment – Temp Cache

- **File Server:**

- Enterprise grade file server or NAS
- NAS: CIFS – Disable OPLOCKS

Cache smarter...not harder

Optimize Your Environment

Configuration Considerations

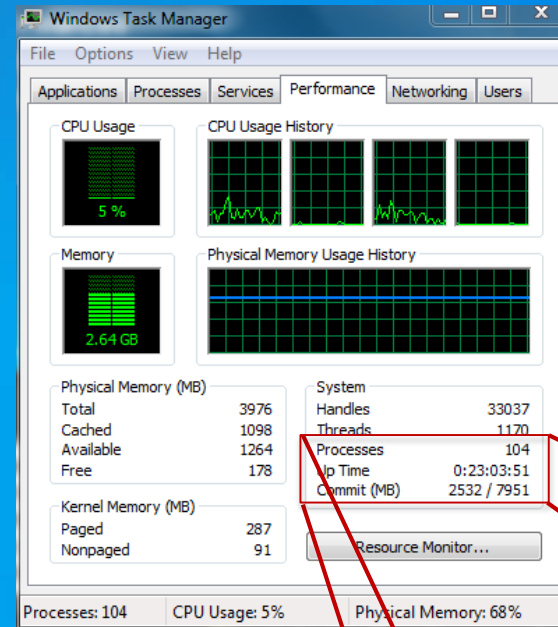
- **Hardware (cont):**

- **Server RAM:**

- Don't run out of RAM before you run out of CPU's
- 2GB or 4GB per core

- **Operating System (OS)**

- Pagefile (PF): Windows default is RAM = System Managed Pagefile
- Determine if you need to trim PF to get more local storage
 - [MS KB2860880](#)



A close-up view of the system metrics from the screenshot. The 'Commit (MB)' value is circled in red, indicating the current memory commitment relative to the total available memory.

Processes	104
Up Time	0:23:03:51
Commit (MB)	2545 / 7951

Optimize Your Environment

Configuration Considerations

- **OS (cont)**

- **Windows DEP: Turn on for essential Windows programs and services only**
 - Or...set exceptions for:
 - C:\Program Files\ArcGIS\Server\bin\ArcSOC.exe
 - C:\Program Files\ArcGIS\Server\framework\runtime\jre\bin\javaw.exe
 - C:\Program Files\ArcGIS\Server\framework\etc\service\bin\ArcGISServer.exe
- **Security Log: increase size and set to archive if security policy enforces system auditing**
 - Periodically offload archived logs to free up additional local storage

Optimize Your Environment

Configuration Considerations

- **OS (cont)**

- **Virus Scanner: Disable on-access scanning if possible**
 - Or...set the following exceptions:
 - C:\arcgisserver and all sub directories, exclude for reads and writes
 - C:\Program Files\ArcGIS and all sub directories, exclude for reads and writes
 - C:\Users\<Service Account>\AppData\Local\Temp and all sub directories, exclude for reads and writes

Optimize Your Data

Data Health Checks

- **File Geodatabase:**
 - Spatial Index
 - Compact
 - Compress
 - Attribute Index
- **Location:**
 - If you have room, replicate your data stores to each ArcGIS Server machine
 - Test various locations to see where your environment performs best
 - Local vs File Server vs Dedicated File Server

Register Folder

Register Folder with the ArcGIS Server

Name
localData

Publisher folder path
c:\arcgisserver\data Add

Server folder path
 Same as publisher folder path
c:\arcgisserver\data Add

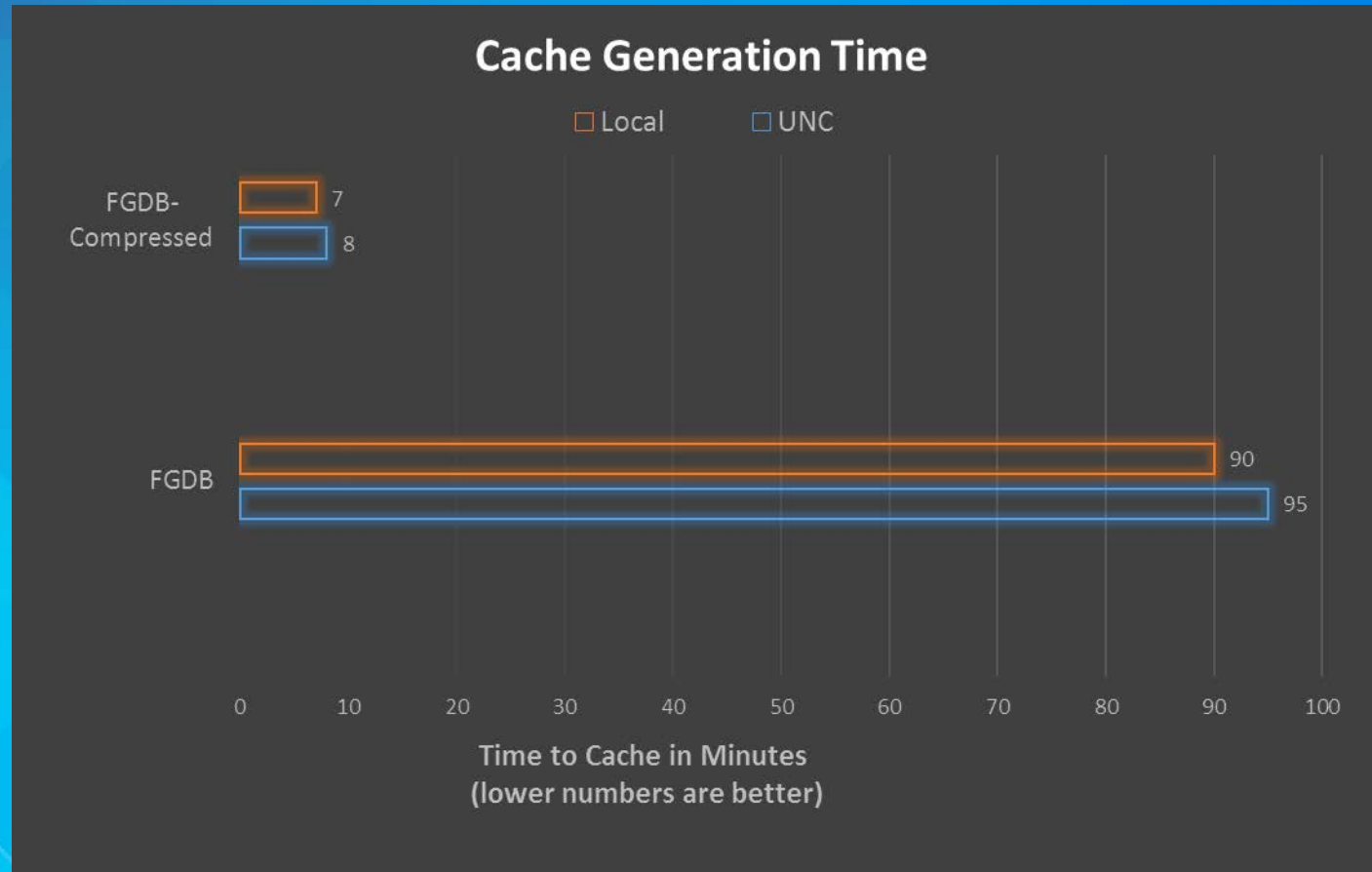
[About registering your data with ArcGIS Server](#)

OK Cancel

Cache smarter...not harder

Optimize Your Data

FGDB Compression Lessons Learned

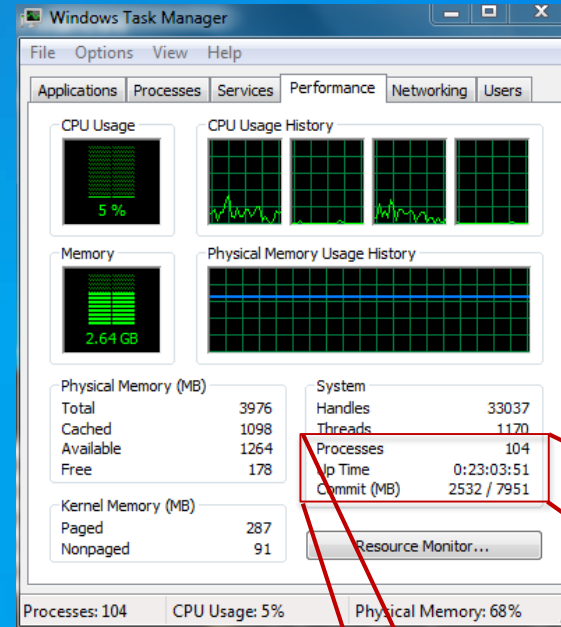


Cache smarter...not harder

Optimize Your ArcGIS Server Site

Configuration Considerations

- **Logging Level = Warning**
 - Logs should be local
- **Cache Services must live in same cluster**
- **Size your Caching Tools Instances:**
 - **N = # of cores per machine**
 - **Min and Max = N**
 - **Adjust N for available RAM if RAM is exhausted during testing**



A close-up of the system metrics from the Task Manager screenshot, with a red circle around the Commit (MB) value.

Processes	104
Up Time	0:23:03:51
Commit (MB)	2545 / 7951

The screenshot shows the ArcGIS Server Administration Console configuration for CachingTools. The Pooling tab is selected. The Specify Number of Instances section has two input fields, both containing the value 2, which are circled in red. The Specify Service Timeouts section has three input fields: 3000000 seconds, 60 seconds, and 180 seconds.

Editing: Site (root) > System > CachingTools

Specify Number of Instances

Minimum number of instances per machine:

Maximum number of instances per machine:

Specify Service Timeouts

The maximum time a client can use a service: seconds

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

The maximum time an idle instance can be kept running: seconds

Cache smarter...not harder

Optimize Your ArcGIS Server Site

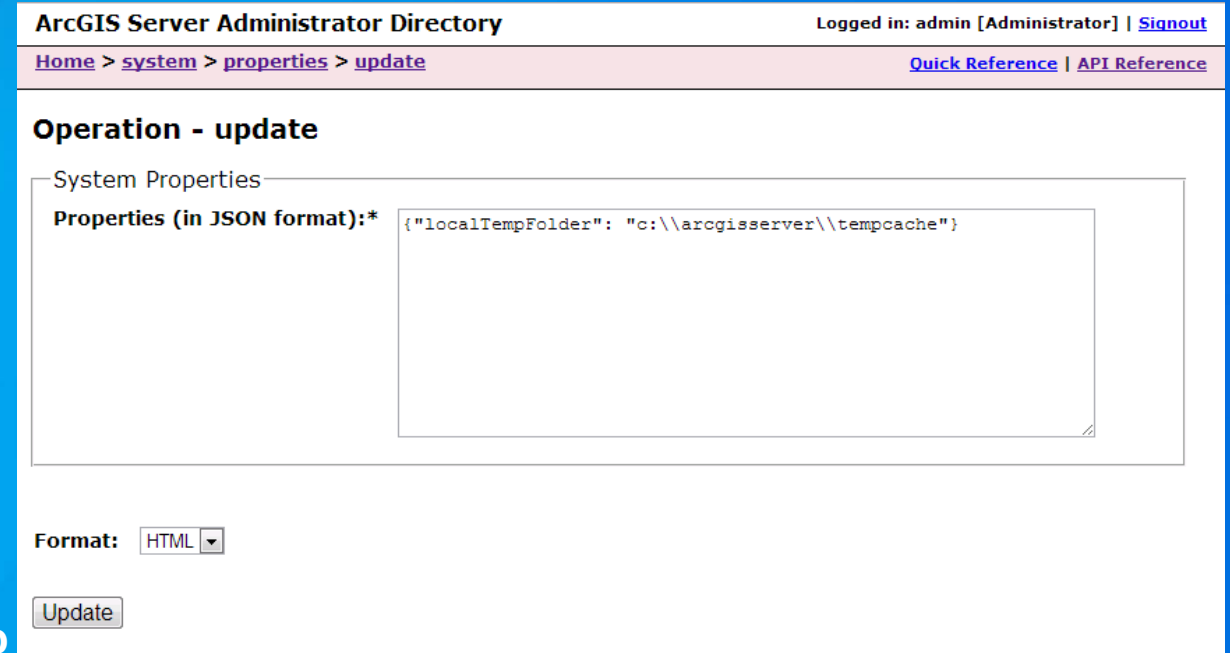
Configuration Considerations

- **Set localTempFolder**

- Ensure you have at least 4GB per Max instances.
 - Max Instances = 4; plan for 16GB of local disk space
 - Adjust if your average bundle size is larger than 4GB

- **Monitor service account temp directory**

- Manually clean as necessary
- C:\users\\AppData\Local\Temp

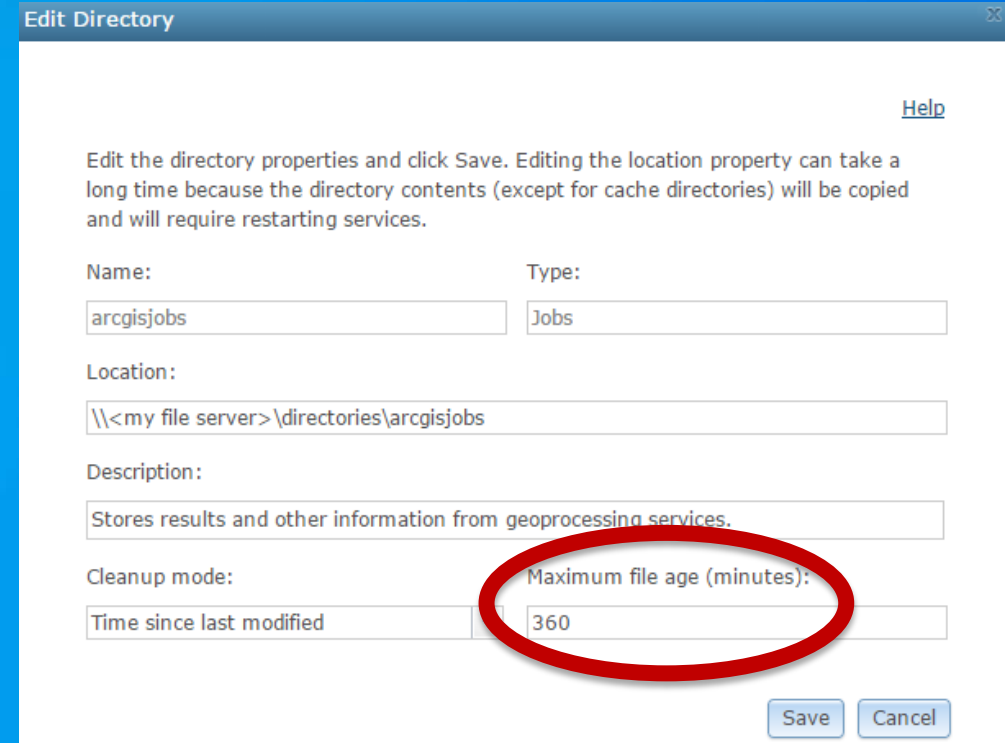


The screenshot displays the ArcGIS Server Administrator Directory interface. At the top, it shows the user is logged in as 'admin [Administrator]' with a 'Signout' link. The breadcrumb navigation is 'Home > system > properties > update'. There are links for 'Quick Reference' and 'API Reference'. The main heading is 'Operation - update'. Below this, there is a 'System Properties' section with a 'Properties (in JSON format):*' label. A text area contains the JSON: `{"localTempFolder": "c:\\arcgisserver\\tempcache"}`. At the bottom, there is a 'Format:' dropdown menu set to 'HTML' and an 'Update' button.

Optimize Your ArcGIS Server Site

Configuration Considerations

- Test various locations for:
 - Config Store
 - Directories
 - Cache Directory
- Set jobs directory cleanup interval:
 - Adjust for file server limitations
 - Avoiding hitting a max number of files per directory can be mitigated by decreasing the cleanup interval; but will add additional disk IO for the file server...could impact overall cache throughput.



Edit Directory

[Help](#)

Edit the directory properties and click Save. Editing the location property can take a long time because the directory contents (except for cache directories) will be copied and will require restarting services.

Name: Type:

Location:

Description:

Cleanup mode:

Optimize Your ArcGIS Server Site

Configuration Considerations

- Adjust or disable Statistic Reports
 - Decreasing the aggregate statistics value will *increase* how frequently statistics are pulled...adding overhead to GIS Server operations...and potentially impacting cache throughput

ArcGIS Server Administrator Directory
Home > usagereports > settings > edit

Usage Reports Configuration

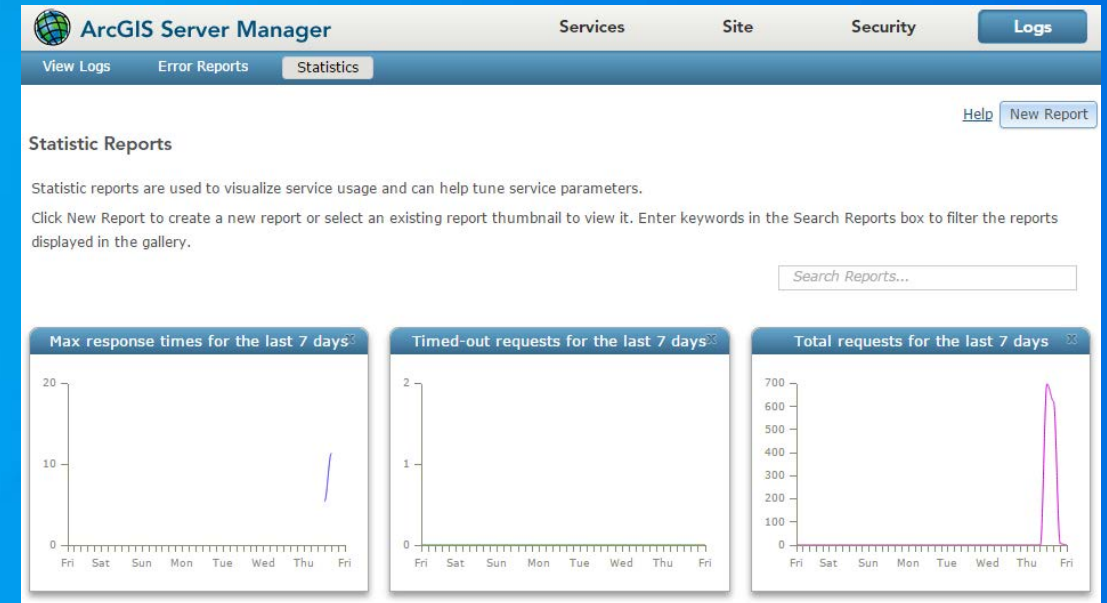
Usage Reports Configuration

Usage Reports Enabled:

Aggregate statistics every (minutes):

Keeps statistics history for (days):

Format:



Cache smarter...not harder

Optimize Your ArcGIS Server Site

Configuration Considerations

- **Scene Caching Tools**
 - **Unit of work**
 - 1 SceneCachingController and SceneCachingTools instance per Published Scene
 - **Use default values**
 - **Requires ArcGIS Data Store component**
 - Test various locations of the Data Store
 - Dedicated Server vs SxS with GIS Server



The screenshot displays two service configuration panels in the ArcGIS Server Administration Console. Both services are Geoprocessing Services and are currently in a 'Started' state. Each service has 0 instances running and 0 instances in use, with a maximum capacity of 6 instances.

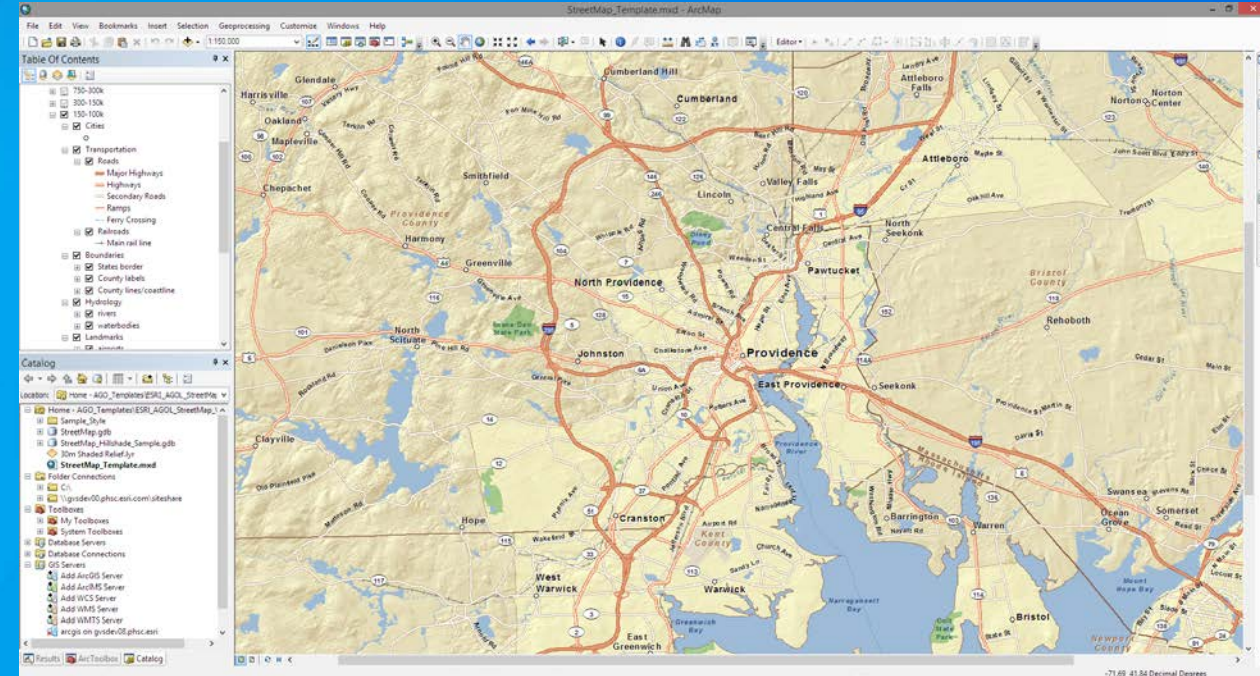
Service Name	Description	Status	Instances Running	Instances in Use	Maximum Instances
SceneCachingControllers	The SceneCachingControllers service is used by ArcGIS Server to create and manage Scene service caches.	Started	0	0	6
SceneCachingTools	The SceneCachingTools service is used by ArcGIS Server to create and manage Scene service caches.	Started	0	0	6

Cache smarter...not harder

Optimize Your Map Documents

Configuration Considerations

- **Maplex:** Only when you need it
- **Choose the right tile type: PNG vs JPEG vs MIXED**
- **Scale Dependencies and Group Layers**
- **Value-based renderers and attribute indices**
- **Map Publishing analyzer**

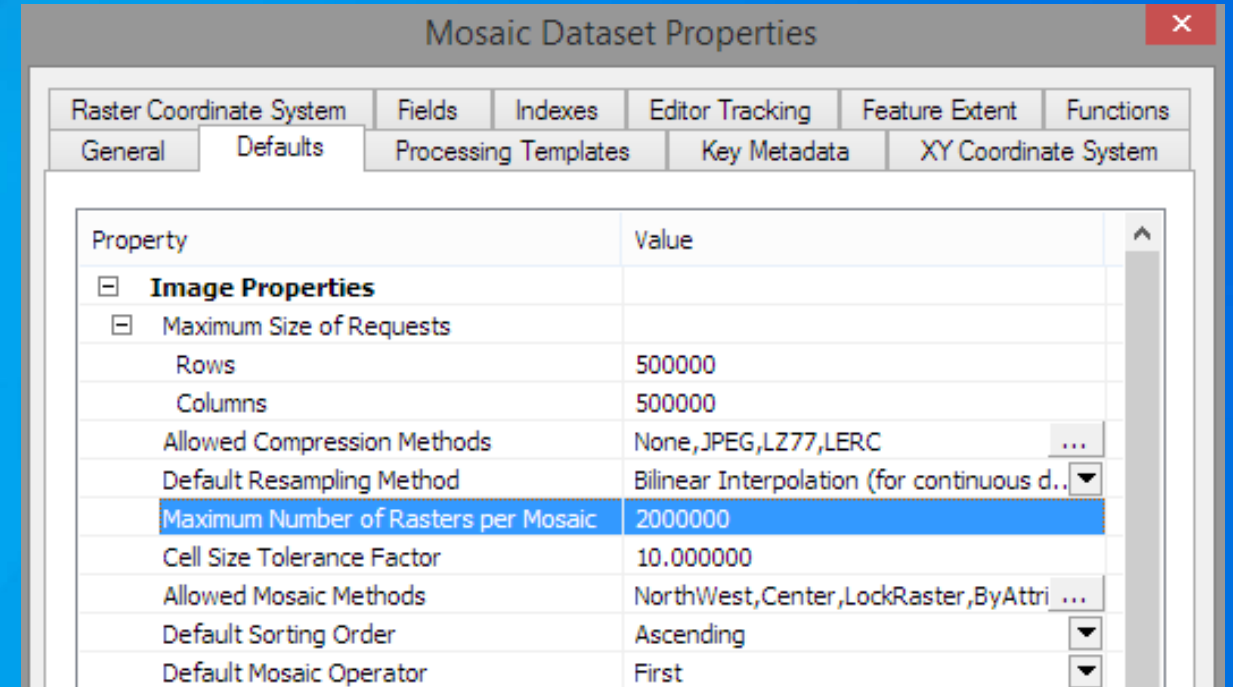


Cache smarter...not harder

Optimize Your Raster Basemap Projects

Configuration Considerations

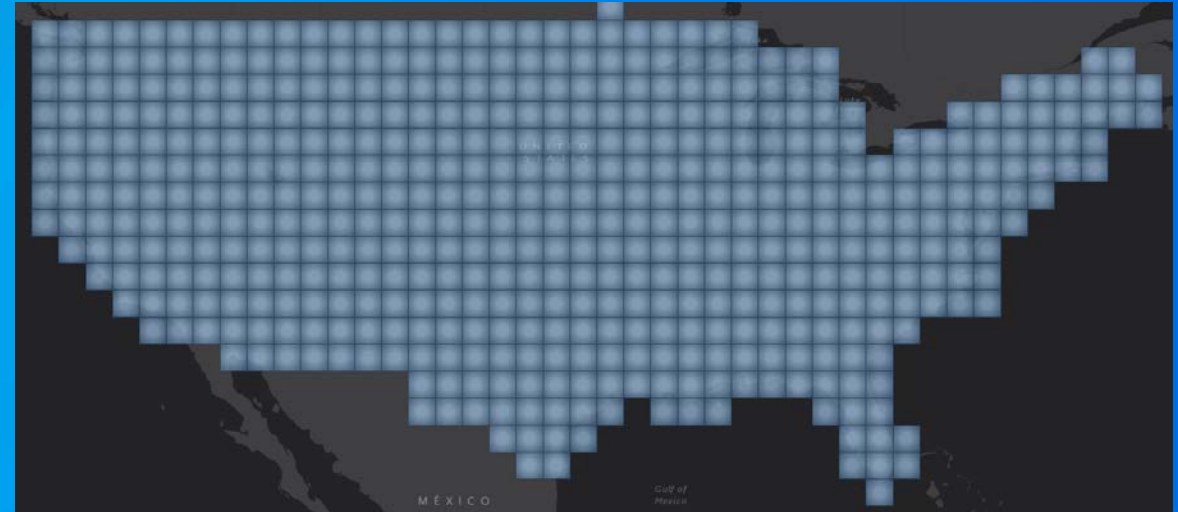
- Source Imagery location
- Source Elevation datasets location
- Mosaic Datasets:
 - Use the analyze tools
 - Spatial Index
 - Attribute Index (Mosaic Method fields)
 - Increase max number of rasters
 - Increase max number of rows / columns
 - Footprints may contain NoData Yes|No
- FGDB and Mosaic Datasets local vs shared file server location



Optimize Your Cache Jobs

Configuration Considerations

- Only cache what is necessary
- Use AOI's with decreasing coverage as you increase LOD's
- Break your basemap project into multiple cache jobs by bracketing LOD's
 - 147M – 577K
 - 288K – 72K
 - 36K – 9K
 - 4K – 1K
 - Each job can / should have a unique AOI
 - Prevents “over caching” and makes better use of available storage

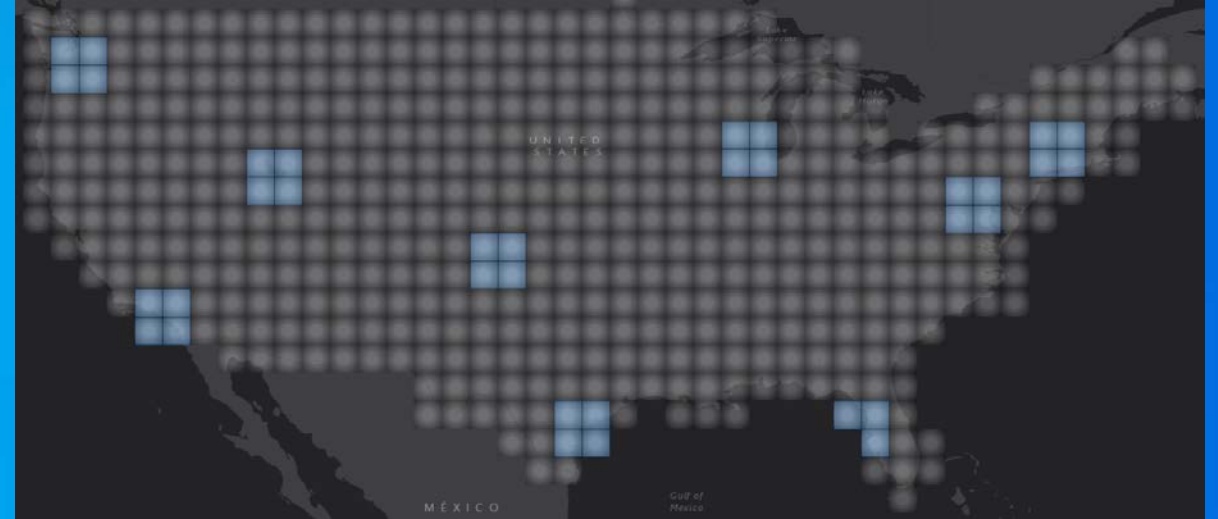


Cache smarter...not harder

Optimize Your Cache Jobs

Configuration Considerations

- **Only update what has changed**
 - Use AOI's to control updates to mature cache holdings
 - You don't need to re-cache everything if you have updates to your data

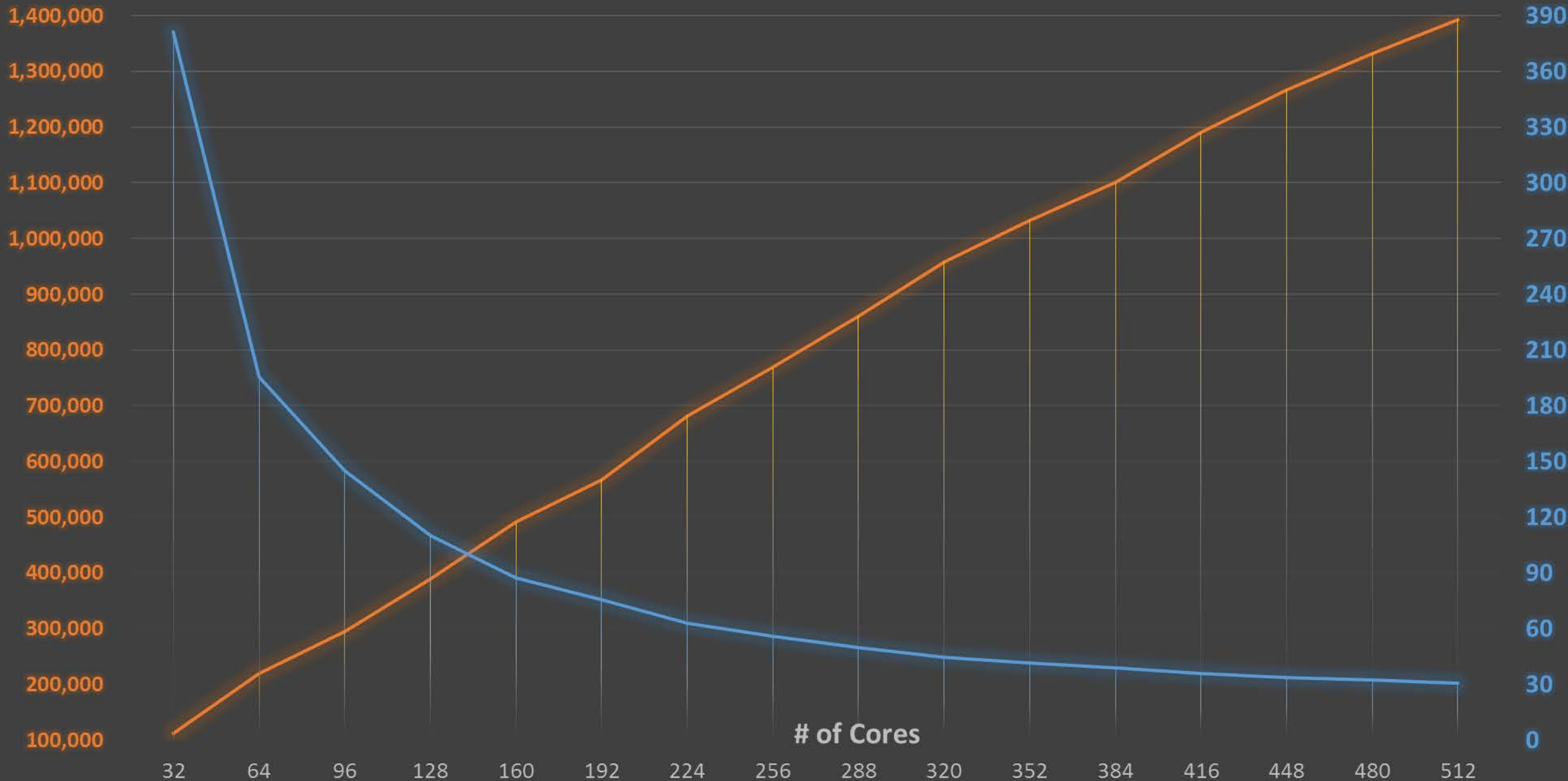


Cache smarter...not harder

Cache Generation Throughput

Generation Time
(in Minutes)

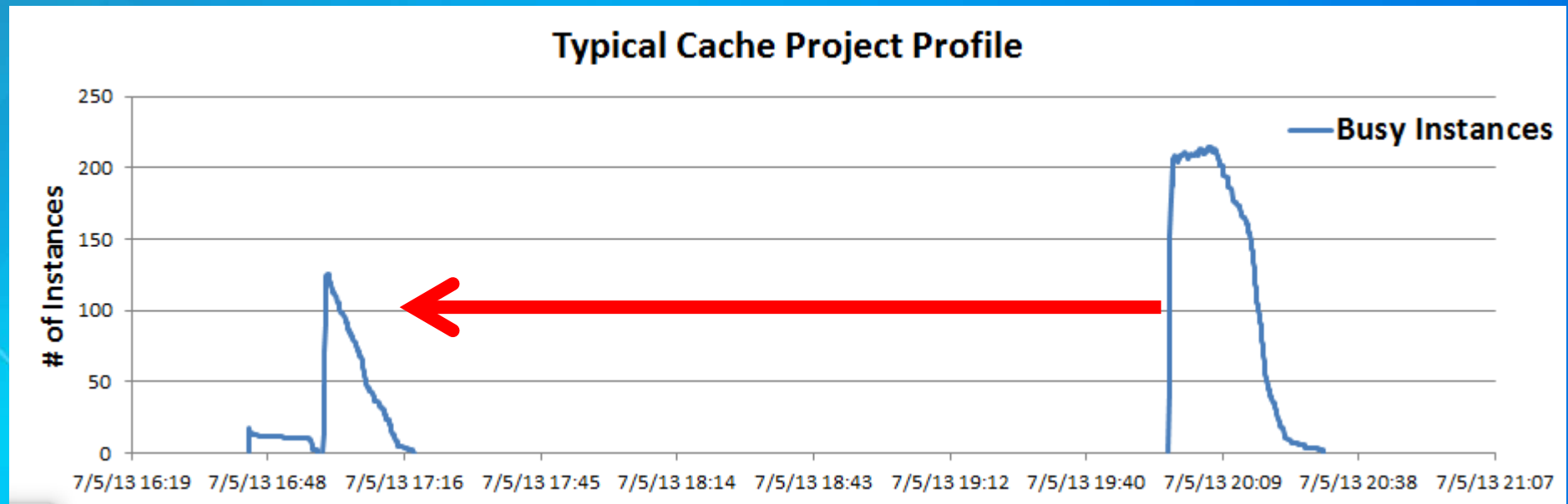
Tiles Per Minute



Optimize Your Cache Jobs

Caching Harder

- Individual cache jobs very efficient
- Timing of cache jobs needs some work



3 Hours, 47 Minutes

Cache smarter...not harder

Optimize Your Cache Jobs

Configuration Considerations

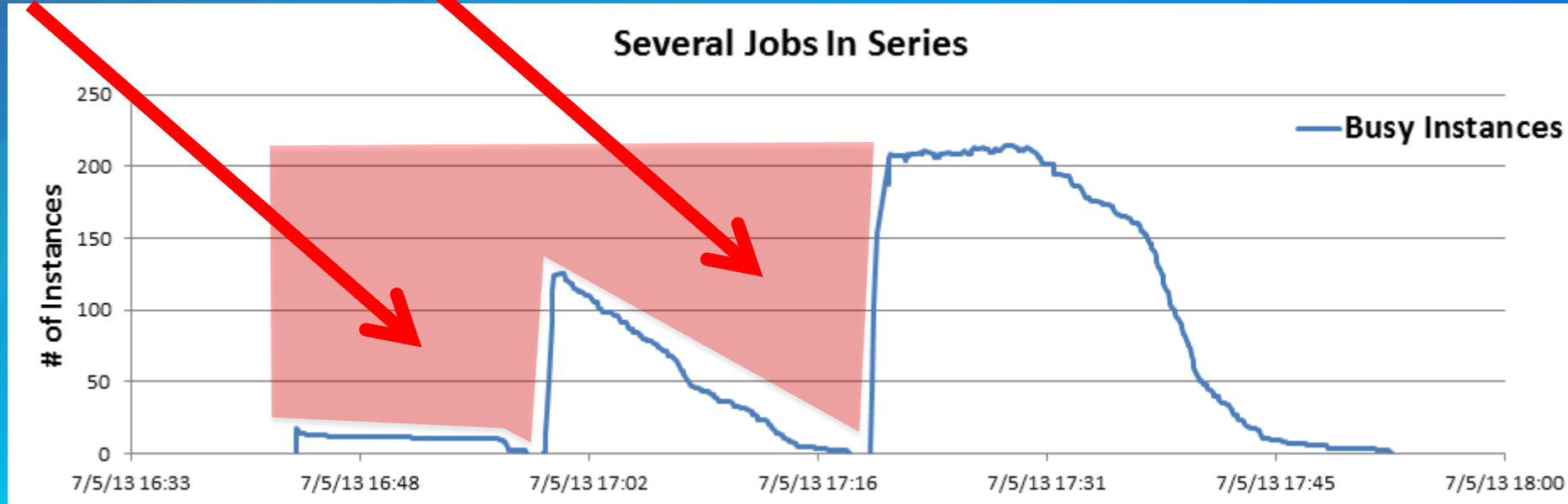
- Automate your cache jobs with python

```
Go Cache Robots Go.py x Document Map
53  ## 12489297,737236,9244648,860618,4622324,434389,2111162,217155,1155581,106577,577790,554289,
54  ## 288895,277144,144447,638572,72223,619286,36111,909643,10855,954822,9027,977411,
55  ## 4513,98705,2256,994353,1128,4971]
56  g_Scales = [400000,200000,100000,50000,25000,12500,64000,32000,16000,8000,4000,2000,1000]
57  p_Scales = [500000,250000,125000,64000,32000,16000,8000,4000,2000,1000,500]
58  FullEvents = ""
59  ExpectedError = ""
60  updateMode = ""
61  in_numOfInstances = "8"
62  in_AOI = ""
63  in_updateExtent = ""
64  baseData = "n:\\vasco\\backup\\manage"
65  compareType = "cachedirectory2"
66  ##fc1 = "n:\\qalab_server\\oydata\\v103\\server\\caching\\managemapservencachetiles\\local\\corine_FC\\Caching_Mask.shp"
67  ##fc2 = "n:\\qalab_server\\oydata\\v103\\server\\caching\\managemapservencachetiles\\local\\corine_FC\\Caching_Mask_Dissolve_multipart.shp"
68  ##fc3 = "n:\\qalab_server\\oydata\\v103\\server\\caching\\managemapservencachetiles\\local\\corine_FC\\split.shp"
69  g_AOI = "n:\\Data\\img\\log000892777\\AOIdata.gdb\\UserAOI"
70  ##customExtent = "-2051206,728356,3179849,659500,3353602,700892,8425265,767331"
71  base2 = "n:\\vasco\\backup\\manage"
72  ##base2 = "C:\\arcgisserver\\directories\\ancgiscache"
73
74  ##Cservice = [{"MSO_C", "COMPACT"}, {"MSO_C102", "COMPACT"}, {"MSO_ex", "EXPLODED"}]
75  ##Cservice = [{"MSO_C", "COMPACT"}]
76  ##for Y in Cservice:
77  ##  in_serviceName = in_serverName + "\\\" + (Y[0] + ".MapServer")
78  ##  PHCreateMapServerCache(in_serviceName, in_serviceCacheDir, "PREDEFINED", "", "",
79  ##  "", "AGOL", "", "", "PNGS", "8", Y[1])
80
81  ##service = [{"MSO_C", "MSO_ex", "MSO_C102"}]main", "main_v1"
82  service = ["main"]
83  for Z in service:
84  ##  [Z, 1, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
85  ##  testCase=[[Z, 2, g_Scales[0:12], "RECREATE_EMPTY_TILES", fullExtents, ""],
86  ##  [Z, 3, g_Scales[0:12], "DELETE_TILES", fullExtents, ""],
87  ##  [Z, 4, g_Scales[0:12], "RECREATE_EMPTY_TILES", fullExtents, ""],
88  ##  [Z, 5, g_Scales[0:12], "DELETE_TILES", fullExtents, ""],
89  ##  [Z, 6, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
90  ##  [Z, 7, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
91  ##  [Z, 8, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
92  ##  [Z, 9, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
93  ##  [Z, 10, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
94  ##  [Z, 11, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
95  ##  [Z, 12, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
96  ##  [Z, 13, g_Scales[0:12], "RECREATE_ALL_TILES", fullExtents, ""],
97  ##  [Z, 14, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
98  ##  [Z, 15, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
99  ##  [Z, 16, g_Scales[0:12], "RECREATE_ALL_TILES", g_AOI, ""],
100  ##  [Z, 17, g_Scales[0:12], "RECREATE_ALL_TILES", fullExtents, ""]]
101
102
103
104  ##testCase 1: Creating Cache tiles
105
106  for X in testCase:
107  in_serviceName = in_serverName + "\\\" + (X[0] + ".MapServer")
108  testName = "ManageMapServerCacheTiles TEST " + str(X[1]) + ". " + X[3] + " for " + str(X[0])
109  expectedValue = in_serviceCacheDir + "\\\" + X[0]
110  base = baseData + "\\\" + str(X[1]) + ". " + str(X[0])
111  serverfunctions.ManageMapCacheTiles(X[1], testName, in_serviceName, X[2], X[3],
112  in_numOfInstances, X[4], X[5], "WAIT", compareType,
113  expectedValue, base, ExpectedError)
114  #creating copy of the expected data
115  baseData2 = base2 + "\\\" + str(X[1]) + ". " + str(X[0])
116  #rcpy.Copy_management (expectedValue, baseData2)
117
118
```

Cache smarter...not harder

Optimize Your Cache Jobs

Caching Smarter

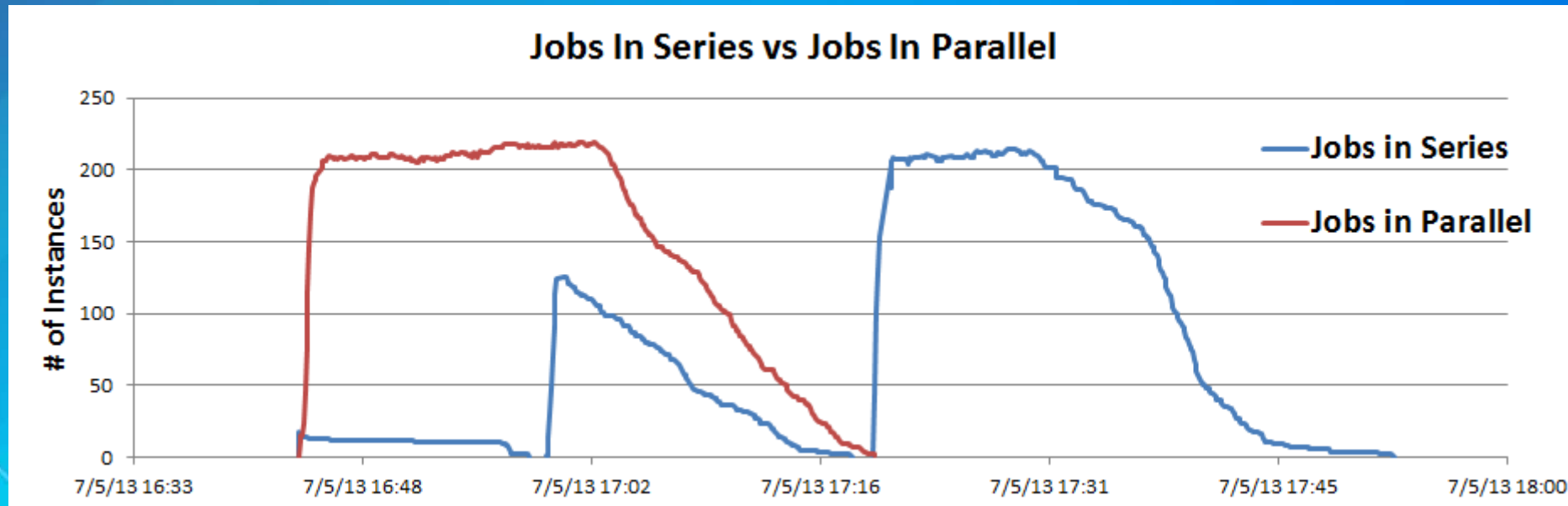


1 Hour, 9 Minutes
70% Time Savings

Cache smarter...not harder

Optimize Your Cache Jobs

Caching Smarter and Faster



37 Minutes

84% Time Savings

Cache smarter...not harder

Optimize Your Cache Jobs

Configuration Considerations

- Manually kick off simultaneous jobs
- Script simultaneous jobs with python
- Size your Cache Controllers Instances:
 - Based on the number of parallel jobs you plan to run, ensure you have enough max instances to support your plan.
- Mind the status.gdb

Editing: Site (root) > System > CachingControllers Help Save and Restart Cancel

General
Parameters
Capabilities
Pooling
Processes
Item Description

Specify Number of Instances

Minimum number of instances per machine:

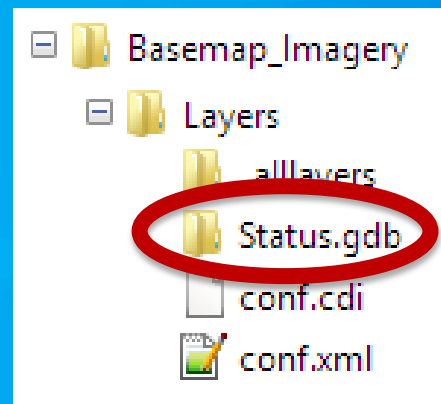
Maximum number of instances per machine:

Specify Service Timeouts

The maximum time a client can use a service: seconds

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

The maximum time an idle instance can be kept running: seconds



Cache smarter...not harder



Summary

To recap...

- ArcGIS Server will scale and leverage your available system resources
- Optimize your environment: test and monitor, tweak hardware, tune OS
- Optimize your data: spatial and attribute indices, compacted, compressed, local
- Optimize your ArcGIS Server: config store, directories, caching tools, localTempFolder, logging, statistics, directory cleanup, temp cleanup
- Optimize your MXD and Raster Projects: analyzer results, organization, scale dependencies, Maplex when needed, Mosaic Dataset tuning
- Optimize cache jobs: AOI's per LOD, only cache what is necessary, py scripting, jobs in parallel when needed

Cache smarter...not harder

Supporting Sessions / Workshops

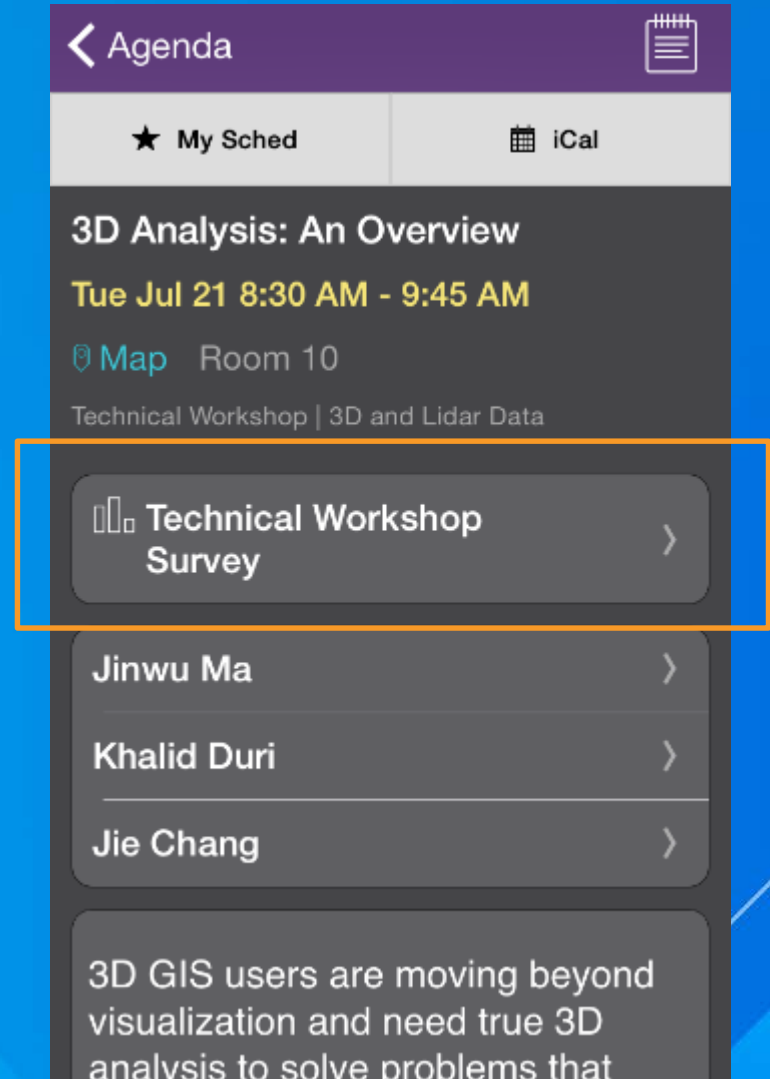
- **ArcGIS for Server: An Introduction (2 offerings)**
- **Designing and Using Cached Map Services (2 offerings)**
- **Enterprise GIS: Performance and Scalability (2 offerings)**
- **Best Practices for Designing Effective Map Services (2 offerings)**
- **Caching Imagery using ArcGIS (1 offering)**
- **ArcGIS Server Performance and Scalability: Optimizing GIS Services (2 offerings)**
- **Introduction to CacheWorx (1 offering)**
- **Road Ahead for Vector Mapping (1 offering)**

The background features a vibrant blue gradient. On the left side, there are several overlapping geometric shapes in shades of purple and yellow. One prominent yellow shape contains a faint, light-colored map of a region, possibly a state or county, with its boundaries visible. The word "Questions" is centered in the upper half of the image in a clean, white, sans-serif font.

Questions

Thank you...

- Please fill out the session survey in your mobile app
- Select “Enterprise Architectures for Large Tiled Basemap Projects” in the Mobile App
 - Use the Search Feature to quickly find this title
- Click “Technical Workshop Survey”
- Answer a few short questions and enter any comments





Understanding our world.