ArcGIS Enterprise: Tuning and Scaling

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Related sessions

WORKSHOP	LOCATION	TIME FRAME
• ArcGIS Enterprise: Architecting Your Deployment	• SDCC – Ballroom 06C • SDCC – Ballroom 06C	• Tuesday, 10:00-11:00 am • Wednesday, 4:00-5:00 pm
• ArcGIS Enterprise: Best Practices for Layers and Service Types	• SDCC – Ballroom 06B SDCC – Room 33 A/B	• Tuesday, 2.30-3.30 pm • Thursday, 10:00-11:00 am
• Real-Time and Big Data GIS: Best Practices	• SDCC – Room 07 A/B • SDCC – Room 01 A/B	• Wednesday, 10:00-11:00 am • Thursday, 10:00-11:00 am
• Many, many geodatabase sessions..		

Agenda

Session will cover all components and tiers of ArcGIS Enterprise:

- **ArcGIS Server**
  - **Service authoring and tuning**
  - **Optimizing *individual* services**
  - **Tuning the system for many overall services**
- **Portal for ArcGIS**
  - **Operational aspects like backup models**
- **ArcGIS Data Store**
  - **Understanding the three types of data stores provided with the system**

- **Outside the scope of this session: enterprise geodatabases**

Service fundamentals

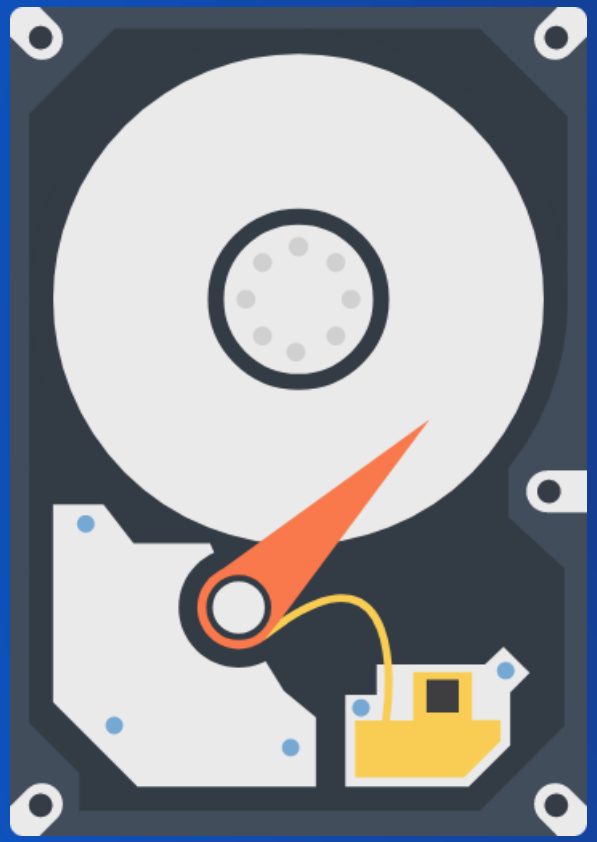
Map authoring: tuning individual services

- Desktop maps don't always make good map services
- Scale dependencies
- Focus your map
  - Definition queries
  - Remove unneeded layers
  - Hide fields you aren't using
  - Annotations over labeling
- Use same coordinate system for data frame as data
- Pro tip: cacheControlMaxAge

General Data Considerations

- Match resolution of your feature class to the accuracy of the data.
  - If your data is accurate to the meter, then no need for millimeter resolution
- For file and enterprise geodatabases remember to index your data appropriately
- For enterprise geodatabases use the recommended spatial type for your RDBMS (st_geometry, native spatial type, ..)

File Geodatabase



- Local file geodatabase data
  - Better than shapefiles
  - Fastest
  - Scales with hardware
  - Best with static data
  - Make your file geodatabase read-only

Enterprise Geodatabase

Enterprise Geodatabase

- Fast
- Live data
- Requires database expert
- Traditional Versioning
  - Fine for desktop editing, may be problematic for server applications
- Branch Versioning
  - New with Pro 2.1 and Enterprise 10.6. Not supported with ArcMap.
  - Designed for better scalability with many concurrent users and a web editing model

Keep statistics up-to-date

Index fields that will be queried

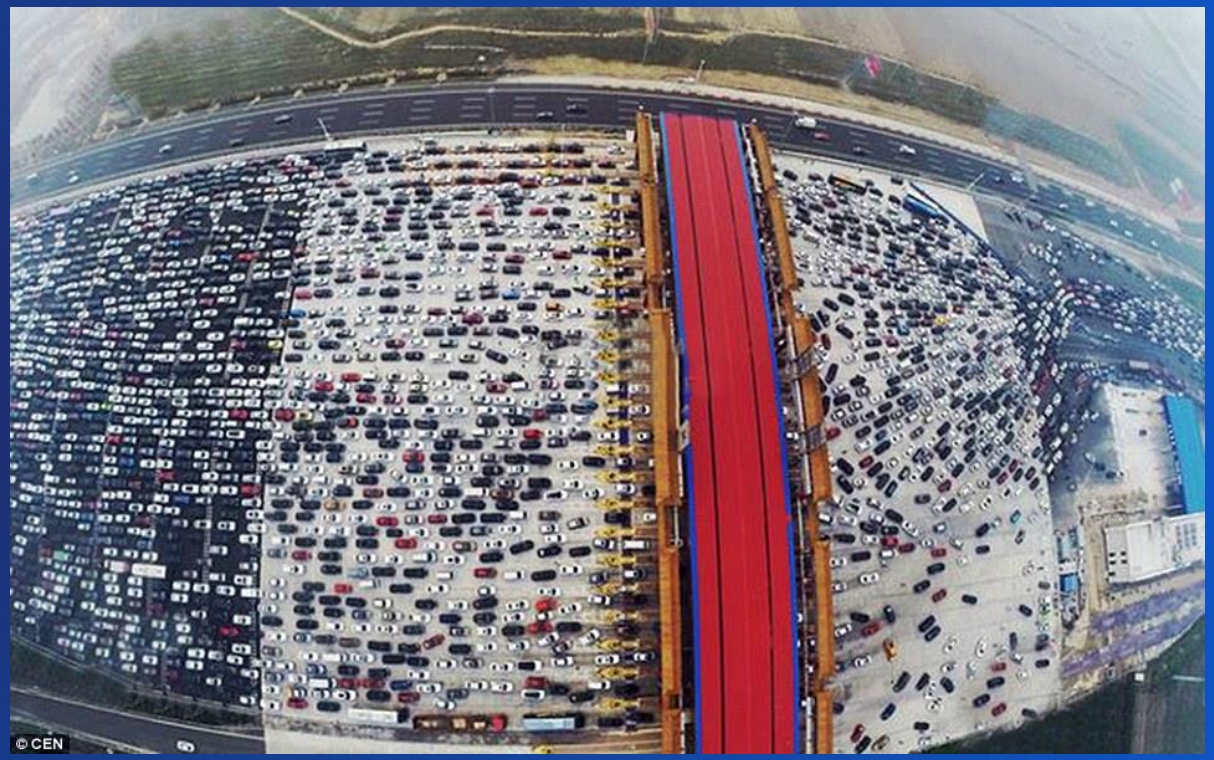
Tuning

Tuning ArcGIS Server- instance tuning

- Two models that services run under: hosted and traditional.
- Any service that references user-managed data in place – like file geodatabase or enterprise geodatabase – is run under the traditional model.
- Traditional model has concept of *service instances* (also known as SOCs).
- **BIG** new feature in ArcGIS Server 10.7+: ***shared instances***

Tuning ArcGIS Server- instance tuning

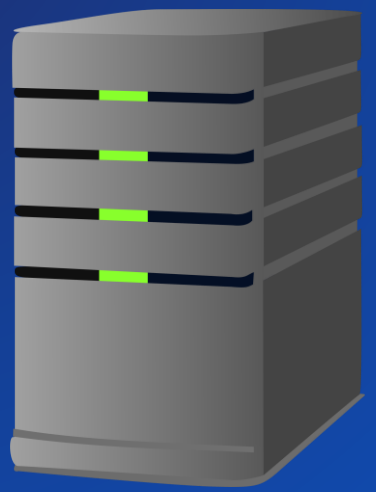
- The number of instances impacts:
  - memory usage at rest (and during use)
  - determines number of *concurrent* requests that can be serviced
- Shared instances completely changes this dynamic. Game changing!
- Traditional model is called using *dedicated instances.* New option for 10.7+ is *shared instances*.



The Over Allocation Problem

- Air Conditioning Business
  - 1 routing service for routing and figuring out guaranteed response times during sales visits. CRITICAL
  - 6 map services for 6 counties sales figures. SECONDARY
- Sales figures come out at the end of the month and suddenly you have 6 map services consuming all 4 CPUs and making your Network Analysis service slow which is unacceptable.

Map Service	Min Instances	Max Instances
LosAngeles	0	1
Orange	0	1
Ventura	0	1
Riverside	0	1
SanBernardino	0	1
Kern	0	1
NetworkAnalysis	2	2



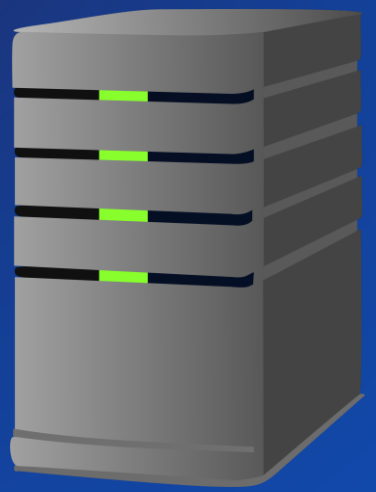
https://gis.acme.com

Has 4 cores

Shared Instances and Allocation

- If I change my county sales services to be shared instances and I set my shared instances to use 2 instances then I will never be overallocated.
- Note that my NetworkAnalysis service (and all other services) benefit even though they aren't shared instances.
- We could add new counties and still be ok, scales as you add services.
- Shared instances also use considerably less memory at peak times which may have a performance benefit as well.

Map Service	Min Instances	Max Instances
LosAngeles	2	
Orange		
Ventura		
Riverside		
SanBernardino		
Kern		
NetworkAnalysis	2	2



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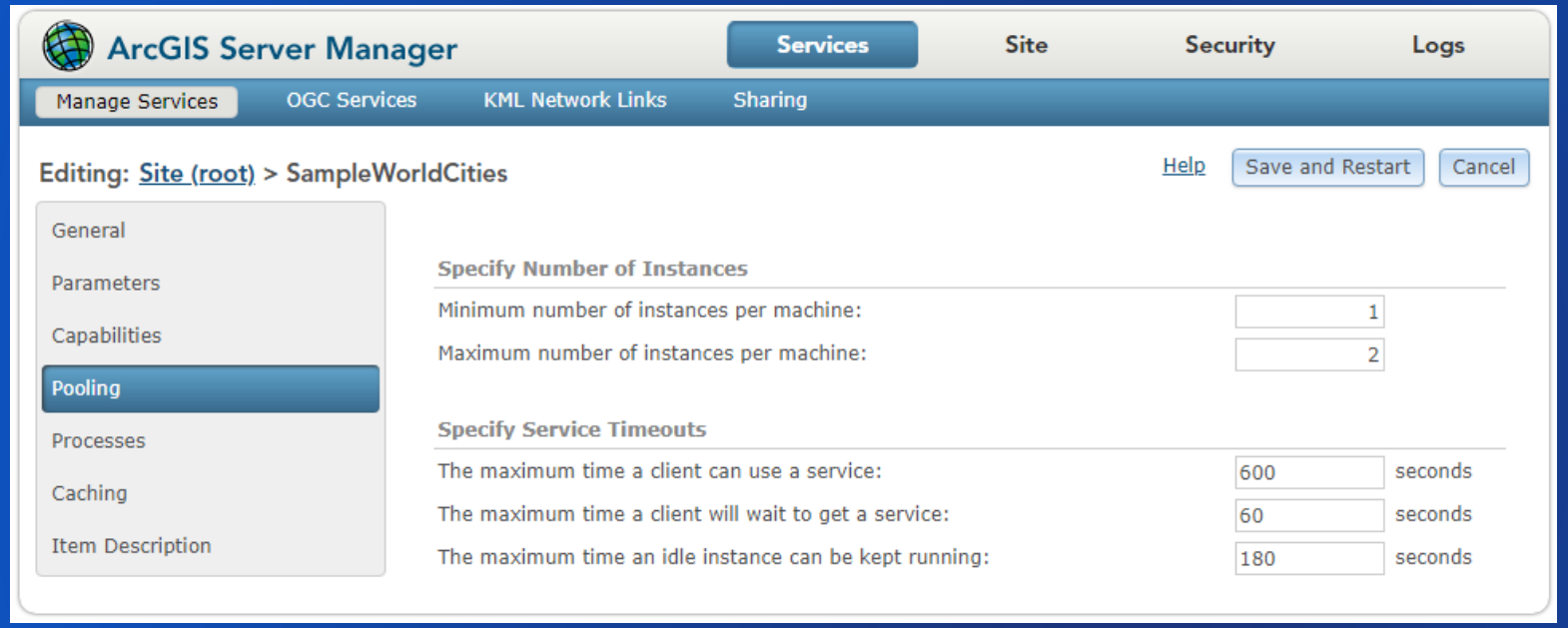
Tuning ArcGIS Server- instance tuning for ArcGIS Server prior to 10.7 and when shared instances are not possible



- For predictable performance use *min* = *max*
- Default is *min* = 1, *max* = 2. Consider changing this!
- Swap space/page file is not a dirty word
- Cached service : set *max* = 1 to conserve memory. Individual tile requests not serviced by the SOC process.

Tuning ArcGIS Server- instance tuning for dedicated instances

- Avoid overload!
- Realize that concurrent *users* does not equal concurrent *requests*.
- Tradeoff:
  - Services with many layers vs. many services with few layers.
- Services with fewer layers have many advantages, but compete for resources.
- *min = 0* can be an option for rarely used services.. but should be an option of last resort.

Tuning ArcGIS Server- instance tuning for shared instances

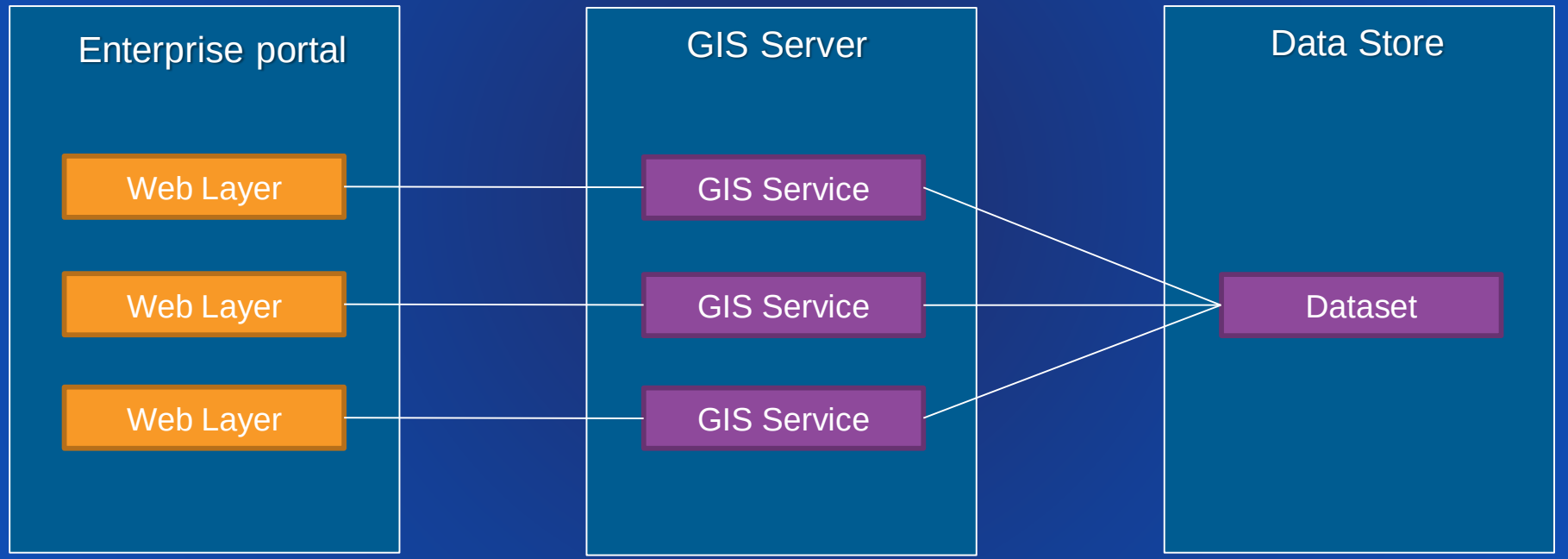
- Avoid *min = 0* when shared instances are available- much better option!
- Use *shared instances* for all compatible services
  - Requires publishing from ArcGIS Pro (not supported for ArcMap-based services)
  - Supports map services using Feature Access, WMS, WFS, and KML capabilities.
  - Not supported for map services using other capabilities or with SOEs and SOIs attached.
- For other service types and services published from ArcMap: use the advice for dedicated instances

Tuning your Web Map

- Hosted feature service considerations
  - Read-only feature services are smaller, use generalized data.
  - If you need some people to edit and some to only read, then use views.
- Reduce clicks - pick your default extent carefully
- Cache (tiles) may reduce the amount of traffic
- Large amounts of data can be slow and overwhelming
  - Aggregate data using smart mapping
  - Latest releases (10.6.1 and higher) has new features for on-the-fly generalization and smaller data transfer (quantization)

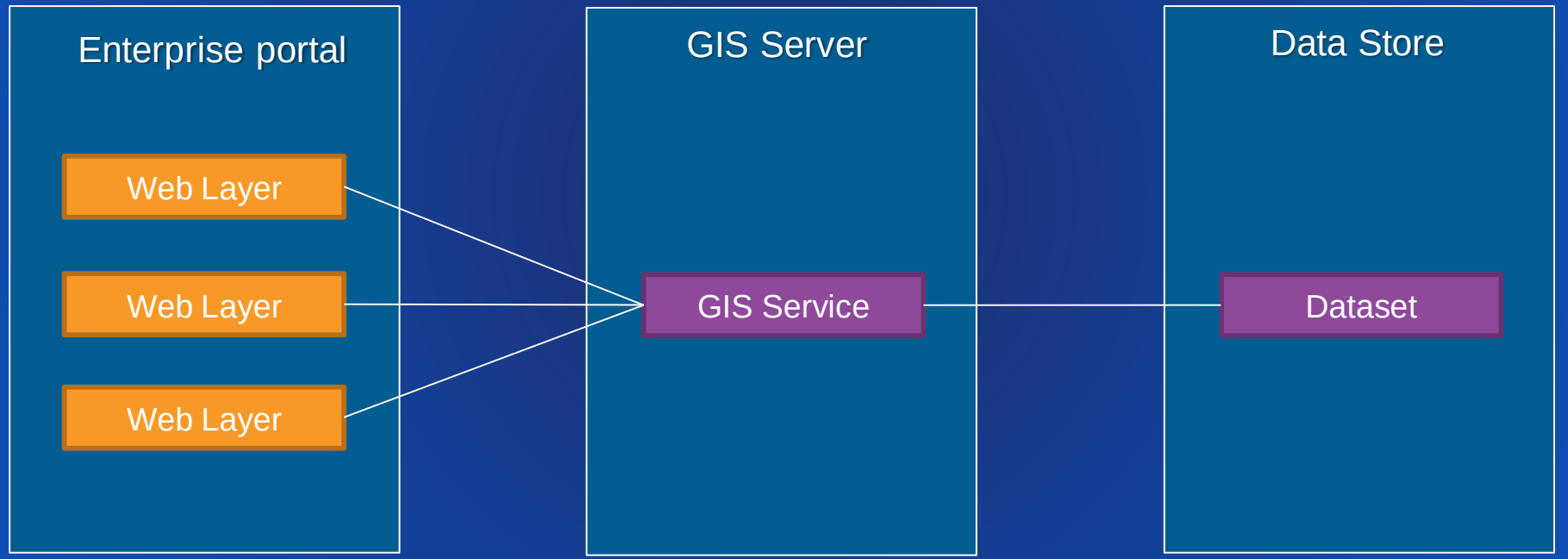
Tuning your Web Map

- **Common setup today:**

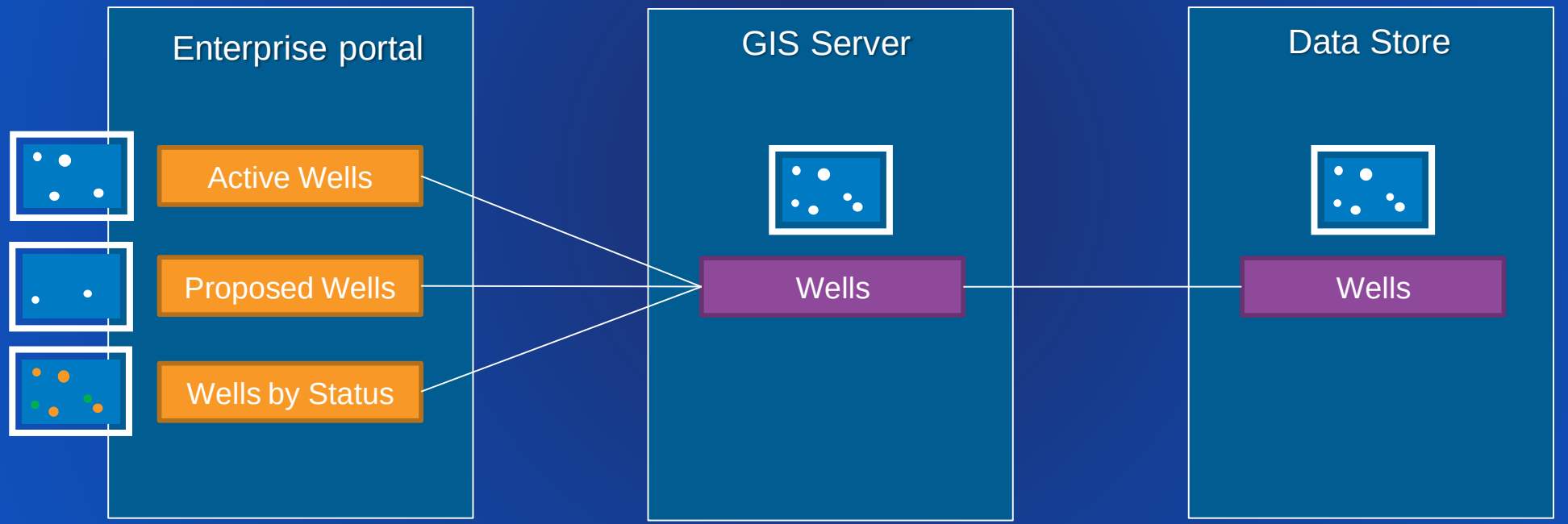


Tuning your Web Map

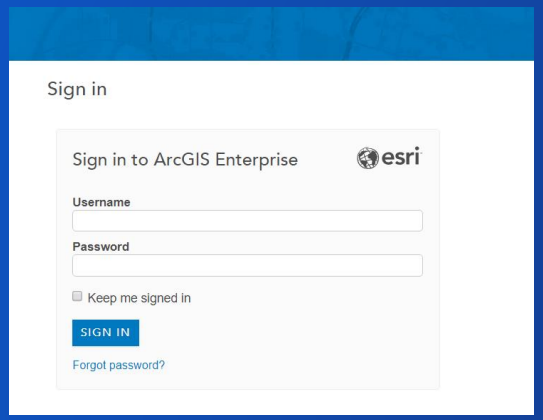
- **More efficient: consolidate layers with like security into a single service**



Tuning your Web Map



Tuning your Enterprise portal



Login settings

- Identity and group stores can affect login performance significantly
- Example: Active Directory where users are in many groups can affect performance (newer releases handle this better)

- **Backups – choose the right combination of full and incremental**
  - Pro tip: after you run the first full backup the portal will begin to allow its database to grow unbounded. Be sure to continue to perform backups on a regular basis to keep the size under control.

Tuning ArcGIS Data Store

- Understand the three types of data stores powered by the ArcGIS Data Store components:

- Relational data store
  - Powers most hosted feature layers

- Tile Cache data store
  - Powers 3D scene layers and services

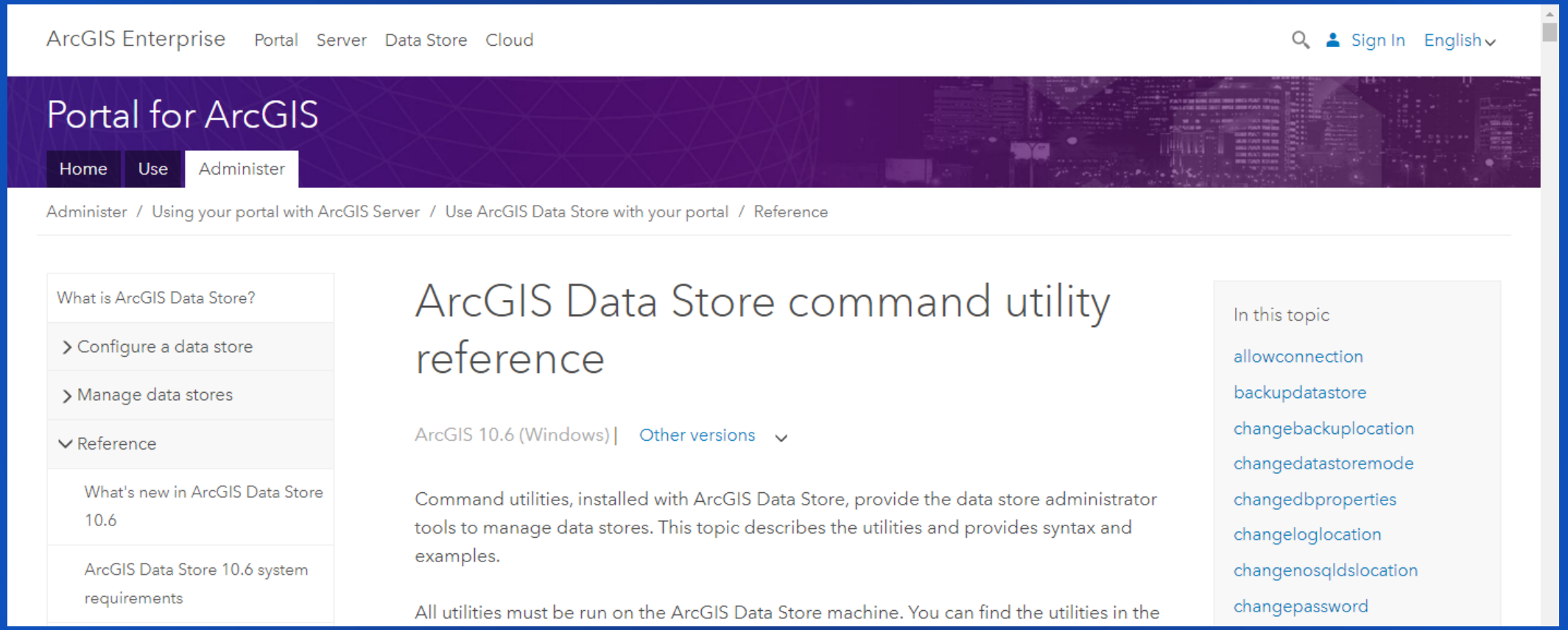
- Spatiotemporal big data store
  - Powers high volume archiving from GeoEvent Server, large result data from GeoAnalytics Server, and track information from Tracker for ArcGIS.

Tuning ArcGIS Data Store

- Many command-line tools for managing and tuning ArcGIS Data Store
  - changedatastoremode (relational data store)
    - go to/from read-only mode
  - changedbproperties (all types)
    - disk space thresholds, RAM heap size for spatiotemporal big data store
  - changeloglocation (all types)
  - changebackuplocation (all types)
  - updatebackupretaindays (all types)
  - updatebackupschedule (all types)
  - etc.

- The *describedatastore* command gives insights into configuration on current machine.

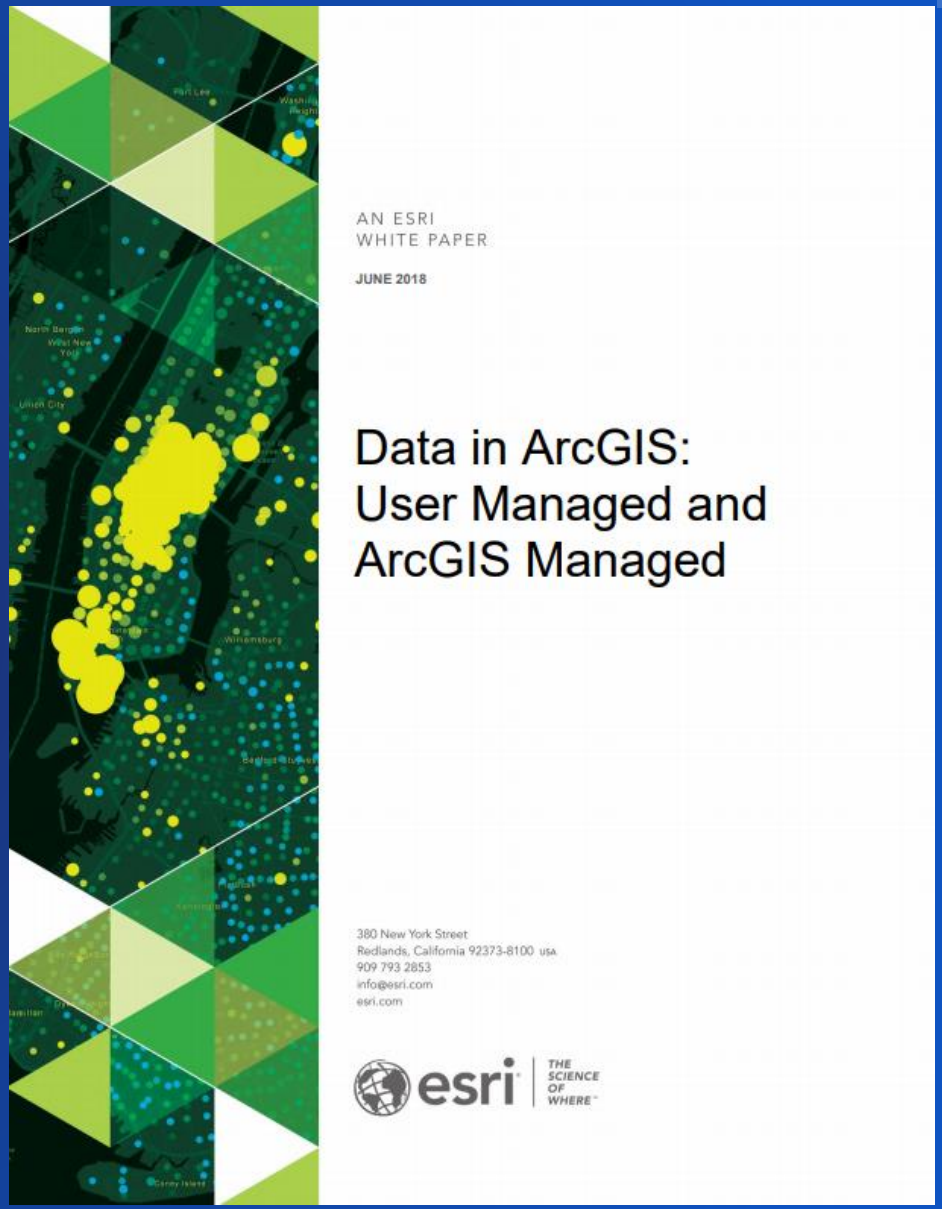
Tuning ArcGIS Data Store



Tuning ArcGIS Server- an aside..

- Two models that services run under: hosted and traditional.

- For background and more information on the hosted model, how it relates to the traditional model, where data is stored, and why:



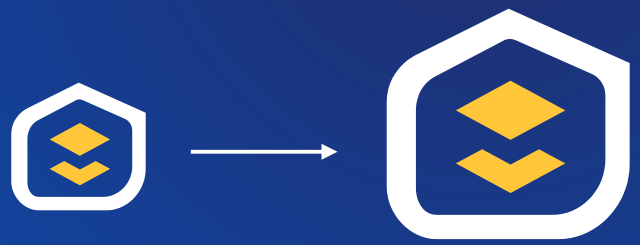
Scaling

Scaling Direction

- **Scaling up**
  - Adding resources to your existing machine
  - Usually RAM
  - Commonly, due to lots of service instances
- **Scaling out**
  - Add more machines
  - Usually to get more compute power, sometimes for high availability
  - Commonly, due to increased user demand

The Enterprise portal: Portal for ArcGIS

- When do you need to scale out the Portal for ArcGIS tier?
  - Rarely!
  - Provide more resources for your existing machine(s)
    - Note: Use two machines with Portal for ArcGIS for high availability purposes *not* for scaling
  - Monitor CPU and memory usage to see if you need more resources



ArcGIS Server sites

Adding additional GIS Server sites

- Pre-planning is important
- Isolate hosting server site from traditional GIS Server duties
- Have dedicated GIS Server sites for various purposes: heavily used map services, geoprocessing services, …

Scaling existing sites:

- Vertically- adding resources to existing machines
- Horizontally- adding additional machines to existing site

OR

Scaling ArcGIS Server may also require....

- Scaling file servers
  - Config-store
  - Data
- Scaling databases
- Scaling your network infrastructure

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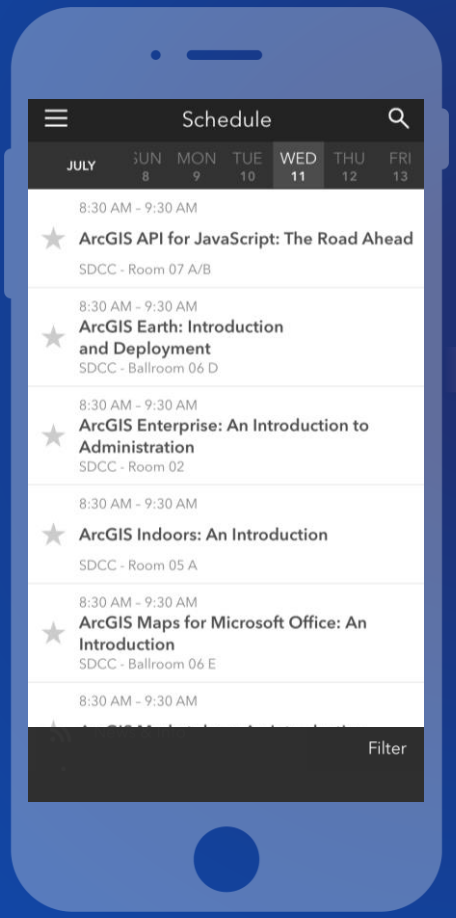
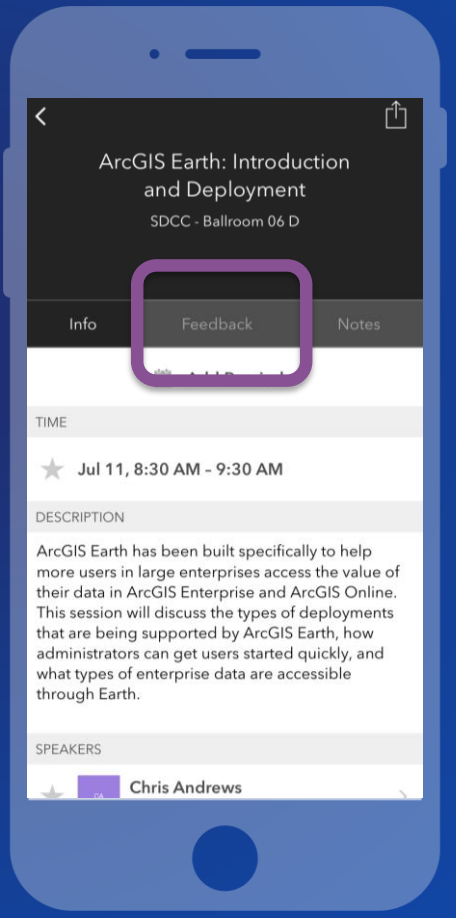
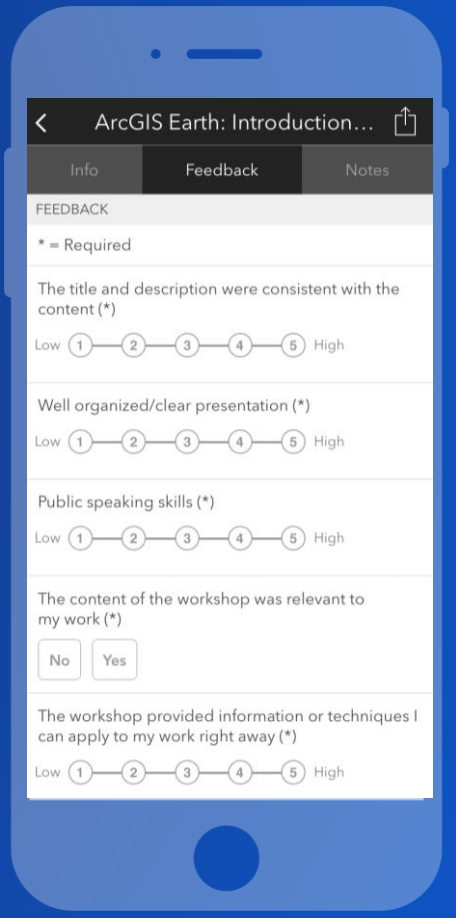


Scroll down to find the feedback section



Complete answers and select “Submit”

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