



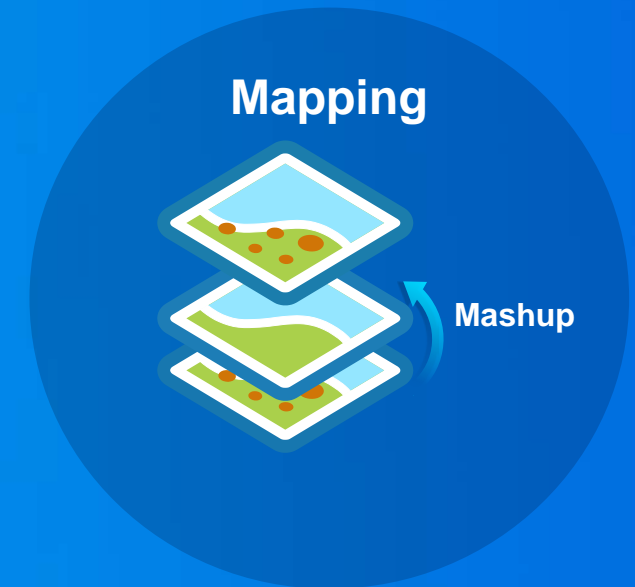
Best Practices for Designing Effective Map Services

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What's in this session

- Planning and design strategies
- Publishing using ArcMap
- Consuming the services in a web map or application
- Performance tips

Please!
Turn **OFF** cell phones



Demo #1

The first attempt 😊

Demo recap

- Publishing wizard and analyzer

Organize data into logical groupings

Operational Layers

Show a focused item of interest

Support functionality
of the application

Displayed on top of base map



Basemaps

Geographic frame of reference

Contain static vector
and raster data

Reusable in multiple applications



Three options for displaying map services

Logical groups in WebMap	Options to display map service
Basemap layers	As tiled/cached map service <ul style="list-style-type: none">- Pre-drawn map tiles- Industry standard for basemaps (e.g. ArcGIS Online, Google, Yahoo, Bing Map etc.)
Operation layers	As dynamic map service <ul style="list-style-type: none">- Server retrieves data, draws an image, sends image to client
	As Feature Layer (aka client side graphics) <ul style="list-style-type: none">- Drawn on the client side- Server sends features with geometries and attributes

What should you cache?

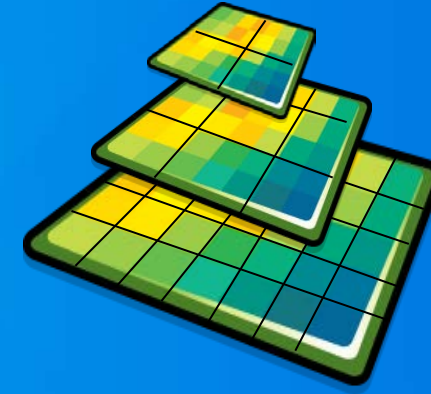
Pre-draw map tiles and serve them to clients

- **Benefits**

- Best performance and scalability
- Map image tiles leverage fast browser retrieval
- Use complex cartography without extra overhead

- **Ideals:**

- To serve large volume of traffic
- For dataset that don't get updated often



- **Disadvantages**

- Requires additional efforts to maintain cache as data gets updated

What should you use dynamic map service for?

Pre-draw map tiles and serve them to clients

- **Benefits**

- No additional overheads upfront
- and when data gets updated

- **Ideals:**

- For real-time or frequently changing data
- To serve medium volume of traffic



- **Disadvantages**

- Additional expense to read data and generate images for each request

Feature layer / Client side graphics

Features drawn in browser

- **Benefits**

- Server off loads works to the client app

- **Ideals:**

- Interactive operational layers for mashups
- Query or geoprocessing results
- Layers that need to be thematically symbolized on the fly
- Web editing: Feature Services



- **Disadvantages**

- Not suitable for larger dataset

- **Source Service types:**

- Map services
- Feature services

Demo #2

Making basemaps



JavaScript API code to draw dynamic images off a TiledMapService

```
var url = "http://{machine}/arcgis/rest/services/myTiledMapService/MapServer";

//Layer#1 - a tiled map service layer
var layer1 = new ArcGISTiledMapServiceLayer(url,
    { displayLevels: [0, 1, 2, 3]});

//Layer#2 - same tiled map service as a dynamic map service layer
var layer2 = new ArcGISDynamicMapServiceLayer(url);
layer2.setMinScale(1155581);
```

Demo recap

- Created two basemaps
- Dynamic images from tiled map service

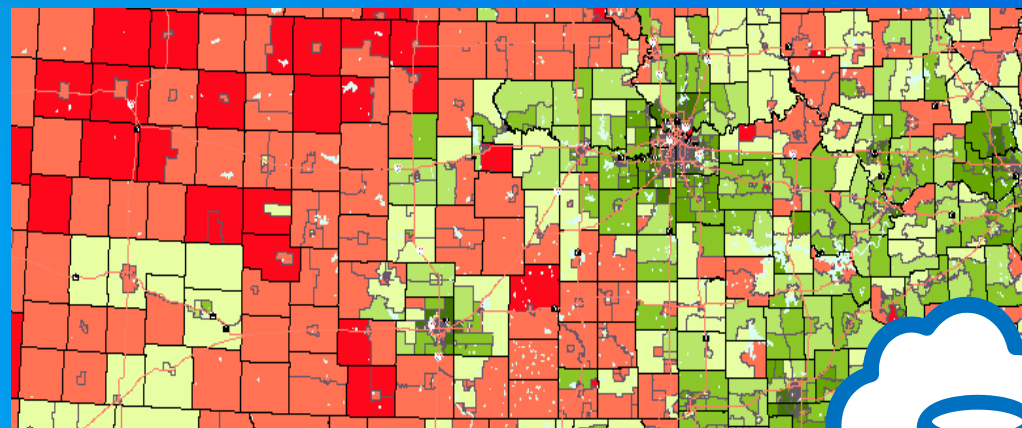
Demo #3

- Creating map service for operation layer
- Thematic mapping and large data visualization

Dynamic layers

New at 10.1

- Simple updates to the map service
 - Remove layers or reorder layers
- Thematic mapping
 - Updates to renderers
 - Change data sources – including joins
- Adding content to the map service
 - Add data from registered workspaces
 - Including query layers



- per-request changes to the map
 - **Server side change**
 - **Stateless**
- Optional capability of map services

SQL Statement to aggregate and show results per county

```
SELECT
  c.objectid,
  c.shape,
  a.total
FROM mysde.map.COUNTIES AS c
INNER JOIN (SELECT
  FIPS, COUNT(*) AS total
  FROM mysde.map.TORNADOES
  GROUP BY cf) AS a
ON c.FIPS = a.FIPS
```



Demo recap

- Create map service for operation layers
- Fixed more analyzer warning
 - Migrated to Enterprise Geodatabase
 - Converted XY Event layer to a table with spatial column
- Query Layer
- Thematic mapping (aka DynamicLayer capability)
- Static Layer/Table ID

Demo #4

Put map services in use in a web application

Demo recap

- Use the map service in a web application
 - Thematic mapping
- Update the table with new records
- Added new layers
- Perform analysis using map server query capabilities

Performance Tips

Mapping

- Cache
- Prefer Annotation over dynamic labeling
- Avoid on-the-fly projection
- Scale dependent layer visibility



Performance Tips

Geodatabase

- **Use File Geodatabase over Enterprise Geodatabase**
 - Use local copy on GIS server over network share
- **For joins**
 - Keep both target and destination tables in the same database
- **Enterprise Geodatabase tips**
 - Tune e.g. update statistics
 - Use direct connection



Index

- Update Spatial Index
- Have indexes on Field(s)
 - Used in attribute query
 - Used as 'primary' or 'foreign' fields in a join
- Note:
 - Indexes are ignored when a field is used in a SQL methods etc.
 - e.g. WhereClause is “**month**(date) = 10”



Query tips

- Avoid requesting all attributes unless you have to



Feature and layer level security

- Use Server Object Interceptor (SOI)
- *Can be used for other purposes e.g. watermarking etc.*



Automating publishing map services

with Python

- Automate publish, start, stop map services
 - <http://tinyurl.com/nnz4obq>
 - <http://tinyurl.com/opp2glg>
 - <http://tinyurl.com/nqj5h43>
- The Server Admin Toolkit
 - <http://tinyurl.com/78hg32c>

Review

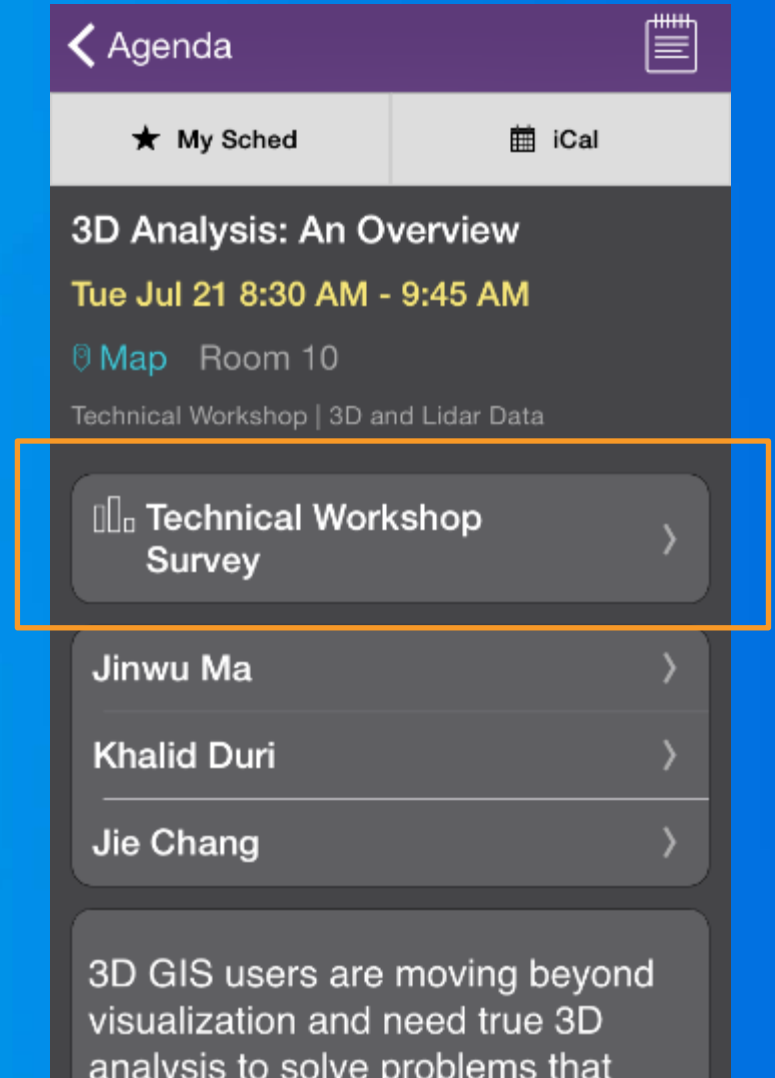
- Analyzed the map document
- Split map into multiple maps for basemap and operation layers
- Replaced XY Event layer with Enterprise Geodatabase
 - ... and update data taking advantages of database triggers
- Strategies to show large data efficiently
 - Use Hex Bins or County polygons to show aggregated data at smaller scale

Review

- **Used dynamicLayers capability for**
 - Thematic mapping and
 - Adding new layers
- **MapServer query supports**
 - Page thru results (*and get the top features*)
 - Summary statistics

Thank you...

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Understanding our world.