Esri International Developer Summit

Palm Springs, CA

Publishing and Using Map Services with ArcGIS for Server

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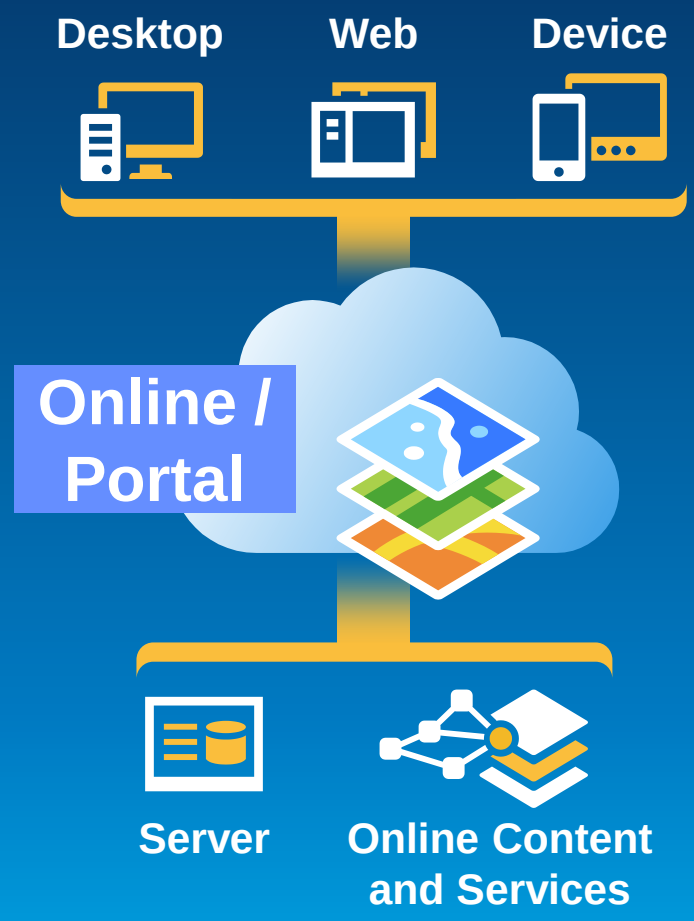
Agenda

- Platform overview
- Publishing services
  - Demo: Publishing hosted feature service
  - Demo: Publishing in the enterprise
- Map services and dynamic layers
  - Demo: Dynamic layers including data upload
- Standardized queries with services
- Questions

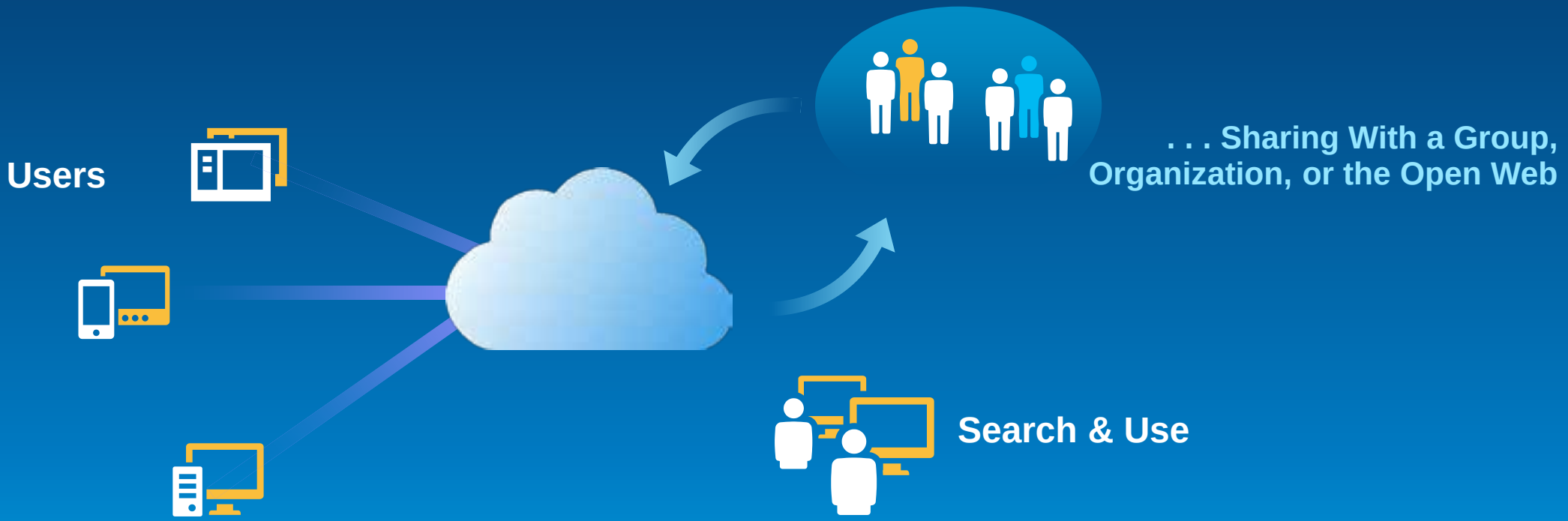
The ArcGIS Platform

- Online / Portal
- Desktop
- Server
- Mobile
- Developer
- Solutions



Publishing services

Information Sharing is Critical



Transparency and easy information access are now expected…

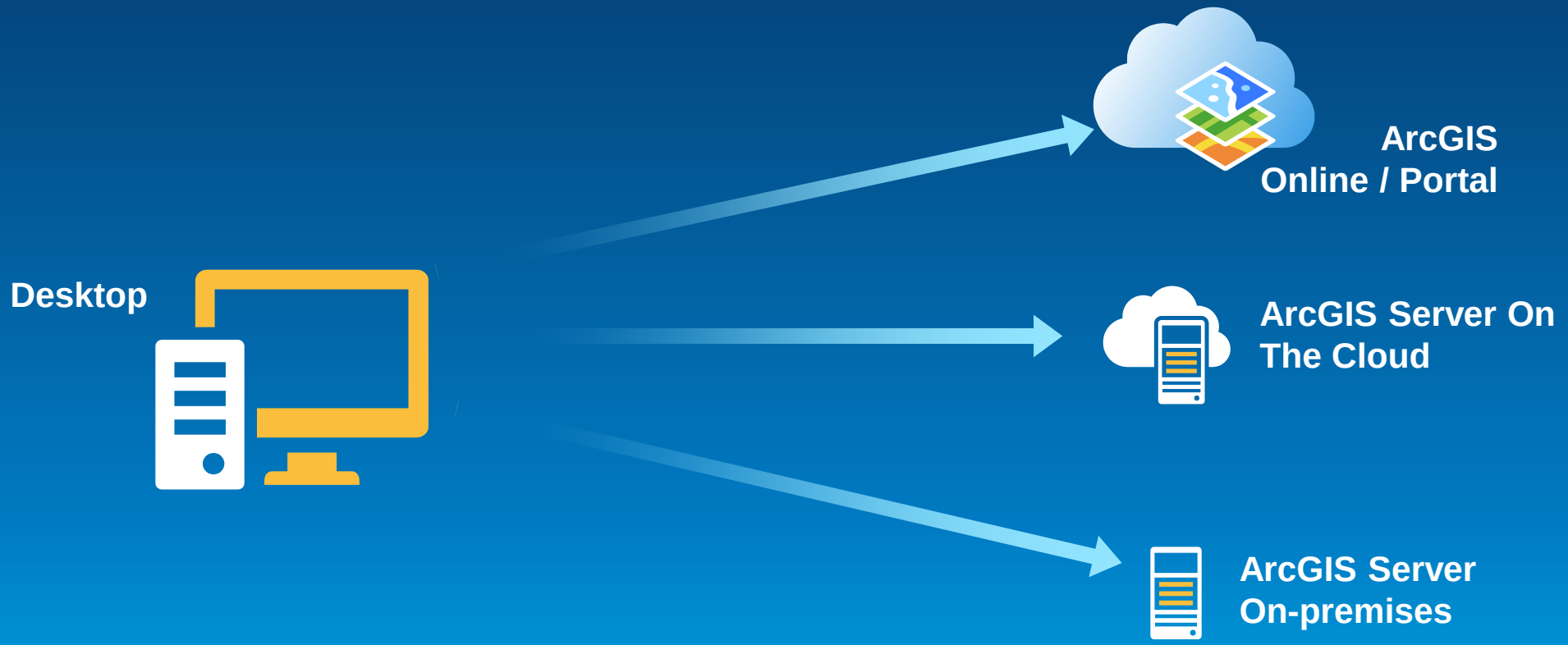
Sharing as Services

Professional to Everyone

Vision

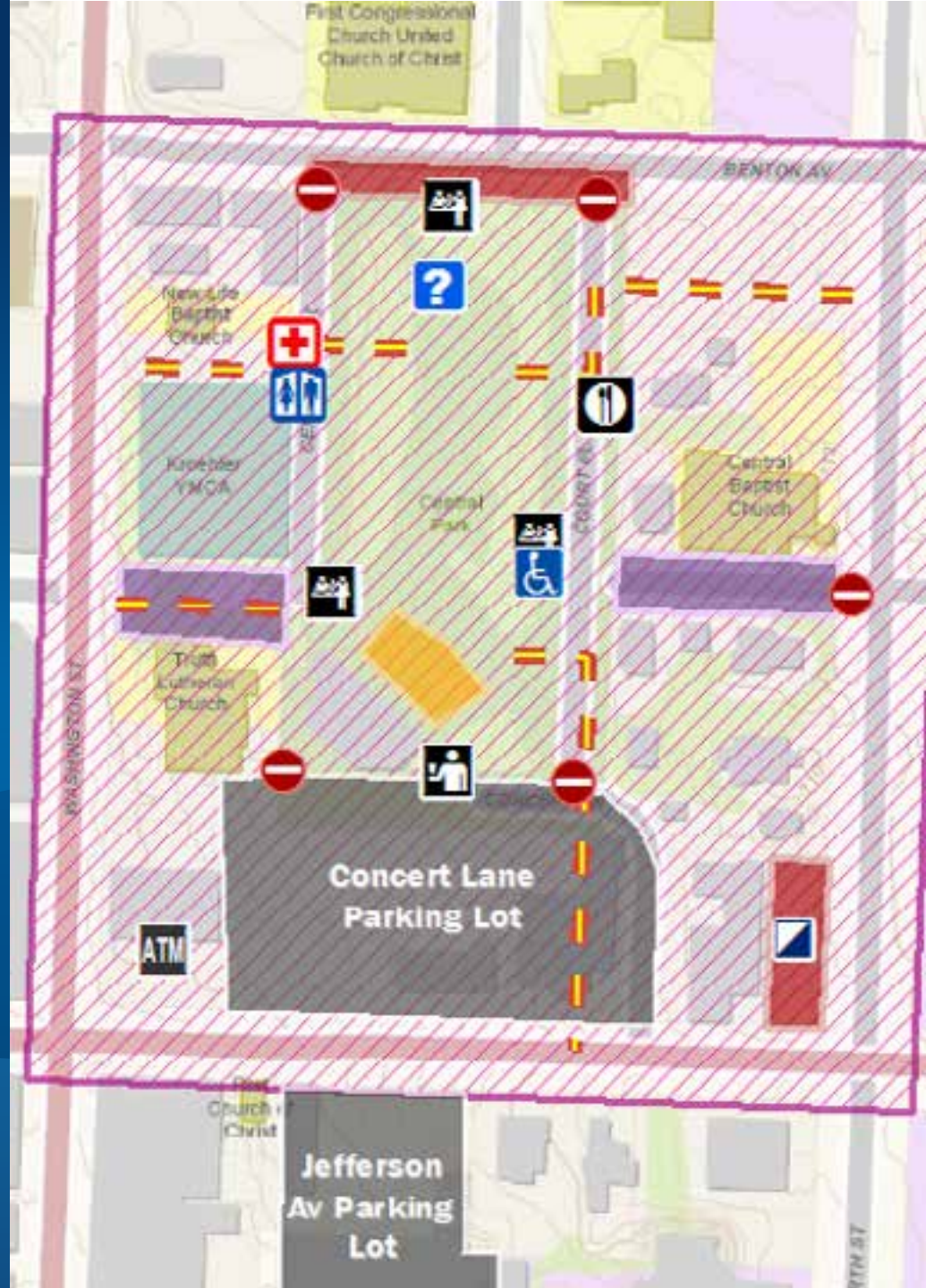
- **Our goal: make it easier to share GIS resources**
  - **Unified sharing experience**
  - **Comprehensive analysis**
  - **Sharing to servers in the enterprise, cloud, and to ArcGIS Online / Portal**

Sharing as Services



Sharing Layers Online

Hosted feature services



Hosted Mapping on ArcGIS Online

- Sharing the easy way
  - No Server to buy, install, or maintain
  - Scales automatically
  - No Firewall or IT issues

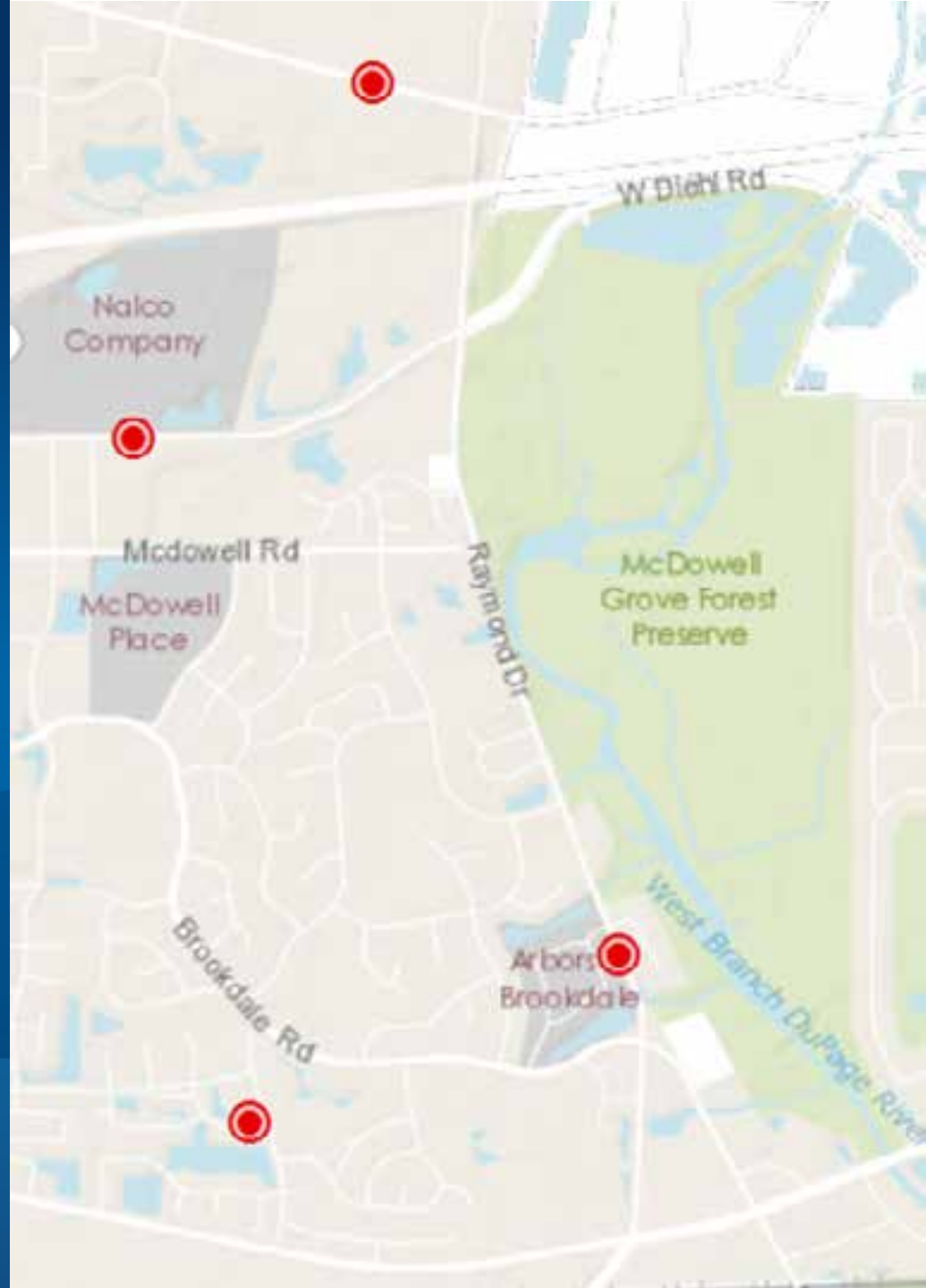
- Limitations
  - Only Tiled Map and Feature Services supported
  - Data is private to each service

Service Definition (.sd)

- File format for publishing all services
  - For all services (Map, Geoprocessing, etc.)
- Contains everything required to create a service:
  - GIS resources (Map, Globe, etc.)
    - embeddable fonts (if needed)
  - Service Configuration
  - Data (if it needs to be copied to the server)
- Uploaded to the server when publishing
- Can be saved and published later
  - Using Catalog or Server Manager

Sharing Layers in the Enterprise

ArcGIS Server feature service shared via Portal



ArcGIS Server in the Enterprise

- Recent improvements
  - Successful publishing of shared data
  - Comprehensive analysis
  - Simple publishing with copying of data
- When to use?
  - Need the full functionality of ArcGIS Server
  - Want full control over all hard and software
  - Want to publish services on live, shared data

ArcGIS Server Data Stores

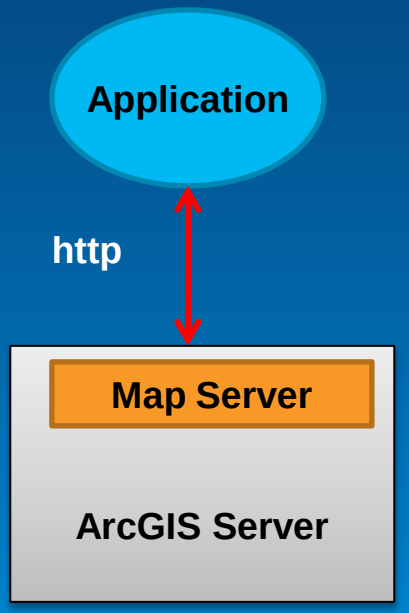
- Server has a list of registered Data Stores
- Data Store is of type
  - Enterprise Geodatabase
  - Folder
    - Tip: register top-most folder level possible for maximal benefit
- Access to the Data Store is validated during registration
  - On all machines in the site
- Replicated data stores for separate data instances
  - Tip: Read Help Topic About registering your data with the server

Data Stores are a key concept for publishing to ArcGIS Server

Map Services: Dynamic layers, statistics, queries

Review of Map Services Since ArcGIS 10.1

- One unified map service
  - An updated optimized map service
  - Supports additional capabilities, data types, layers, renderers
- New extension capabilities:
  - Network Analysis
- New approach for Geoprocessing results



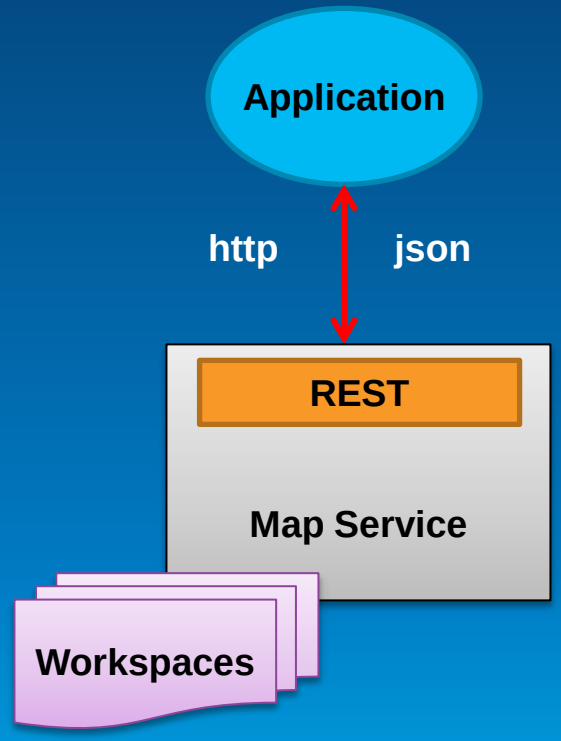
Dynamic Layers: The Concept

- Capability with the map service that allows for per-request changes to the map
  - Optional capability of map services

- Allows for:
  - Updating renderers and symbols
  - Removing and reordering layers
  - Changing layer data sources
  - Adding new layers from registered data sources

Dynamic Layers: Use Cases

- Simple updates to the map service
  - Remove layers or reorder layers
- Thematic mapping
  - Updates to renderers
- Adding content to the map service
  - Add data from registered workspaces
    - Including query layers
- Add to the map on a per-request basis
  - ArcGIS APIs handle this for you



Thematic Mapping

- Special case of dynamic layers supported via
  - Ability to change renderer
  - Ability to change data sources – including joins
  - Map service API for constructing renderer classes

- Generate renderer operation
  - Supports class breaks and unique value class generation
  - Popular classification types from ArcGIS for Desktop

Thematic Mapping

When to use?

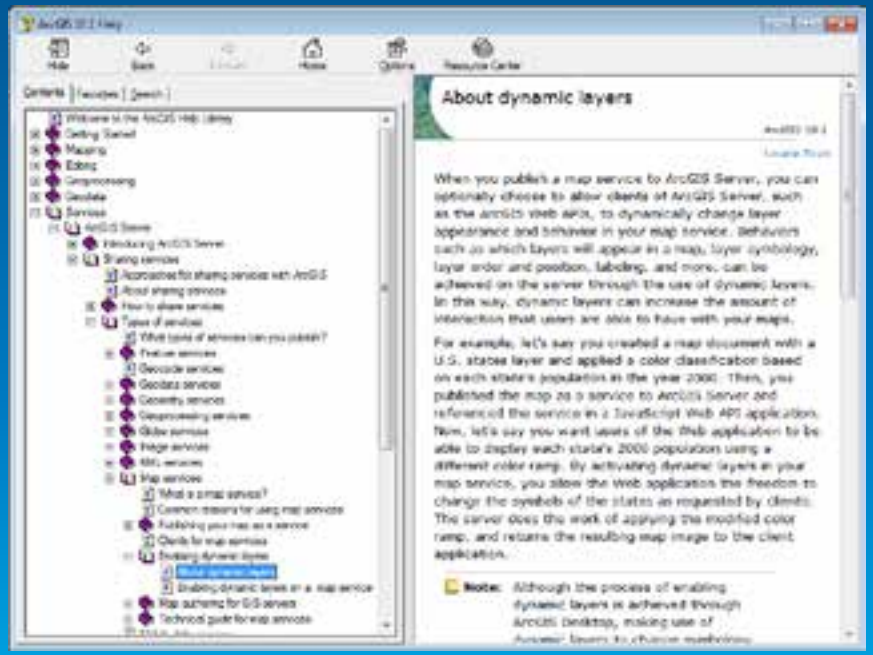
- When do I use dynamic layers instead of feature layers on the client for thematic mapping?
  - large number of features
  - complex geometries that cannot be generalized
  - when it provides a performance advantage

- Each approach has tradeoffs
  - e.g. Client side features scale better and provide more interactive behavior
  - Generate renderer can be used with both approaches

Dynamic Layers

More Information

- See the topic About dynamic layers in the ArcGIS Server help
- REST API – See the Dynamic Layer / Table resource help



Query in Map Services

- **Support for order by, output statistics, and group by statistics was added for both layers / tables**
  - **count | sum | min | max | avg | std dev | var**

- **Optional ability to return M and Z values for features**
- **Can query a specific geodatabase version**
- **Query response contains a flag when maxRecordCount was reached by the query**

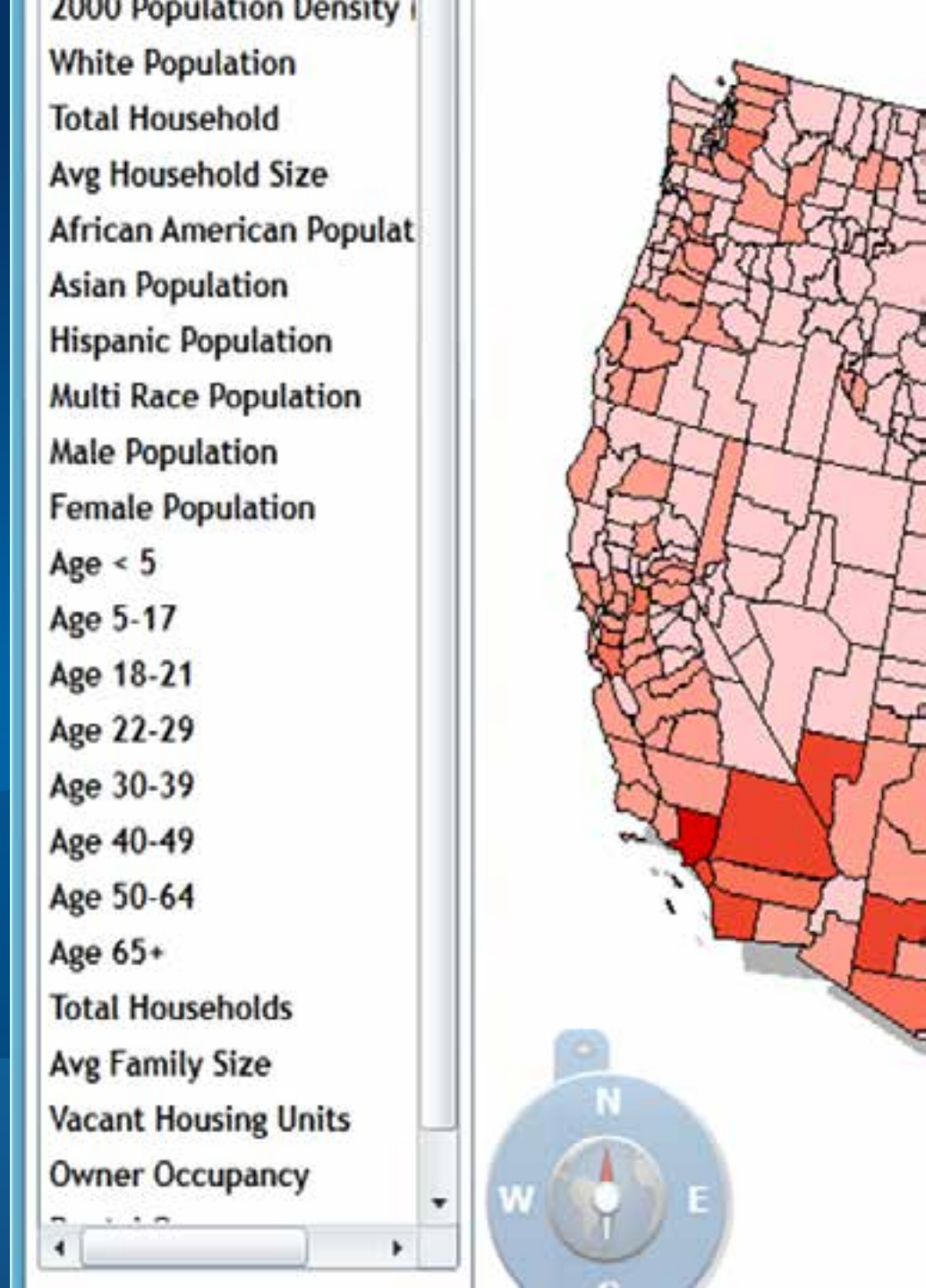
Database Agnostic Way to Query

Standardized Queries - Introduced at ArcGIS 10.2

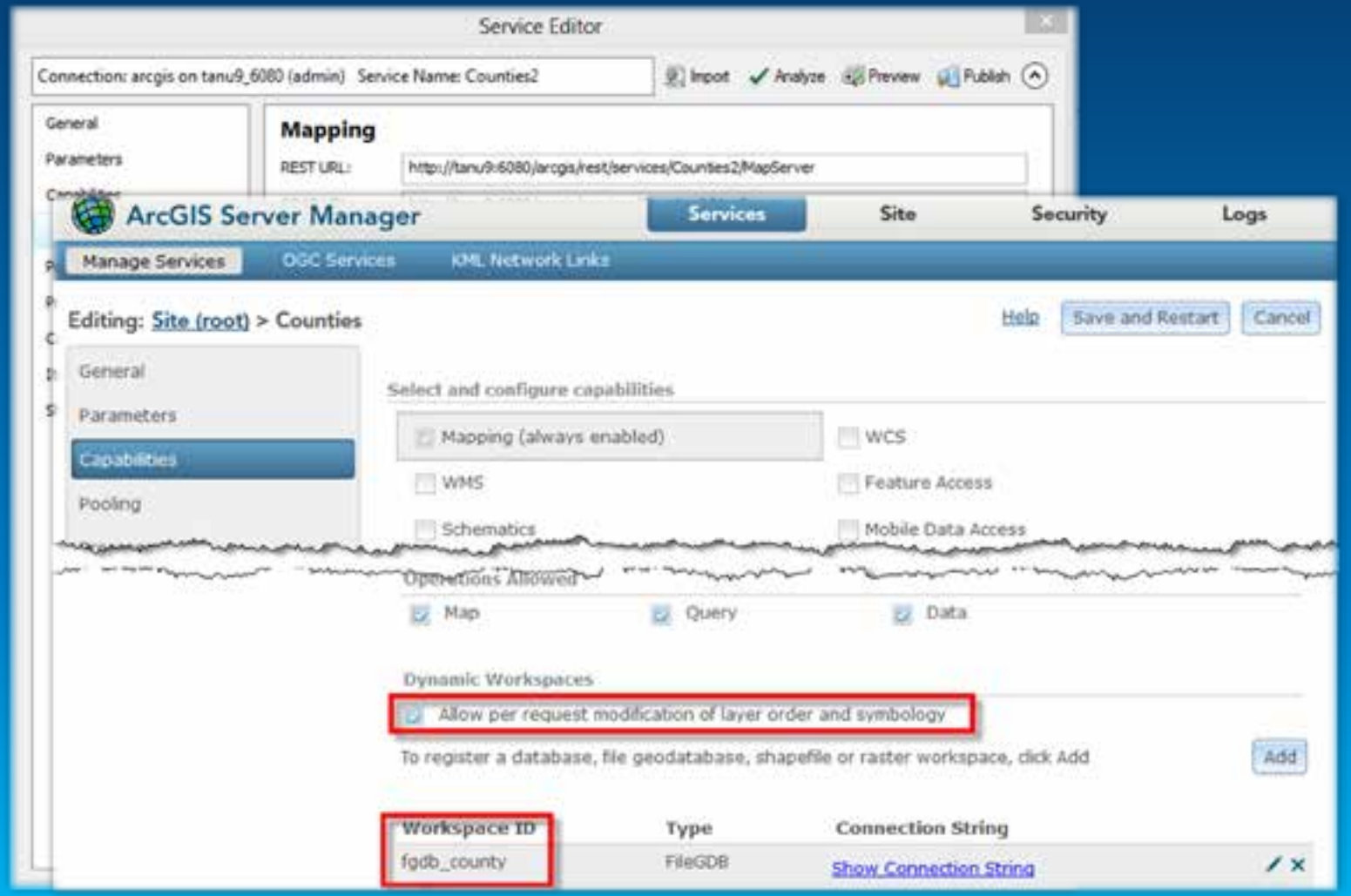
- One SQL syntax runs against all databases!
  - e.g. one date query syntax --- YEAH!
- Based on SQL92 query syntax and functions
  - Does not accept any DB vendor specific queries
- StandardizedQuery is turned on by default
- Limitations at 10.2
  - Only a subset of functions available
  - Not supported for
    - Joined table/layer from multiple workspaces or OLE DB tables
- Server level property
  - To switch back:
  - http://<server>/arcgis/admin/system/properties/update
  - {"standardizedQueries":"false"}

Dynamic Layers

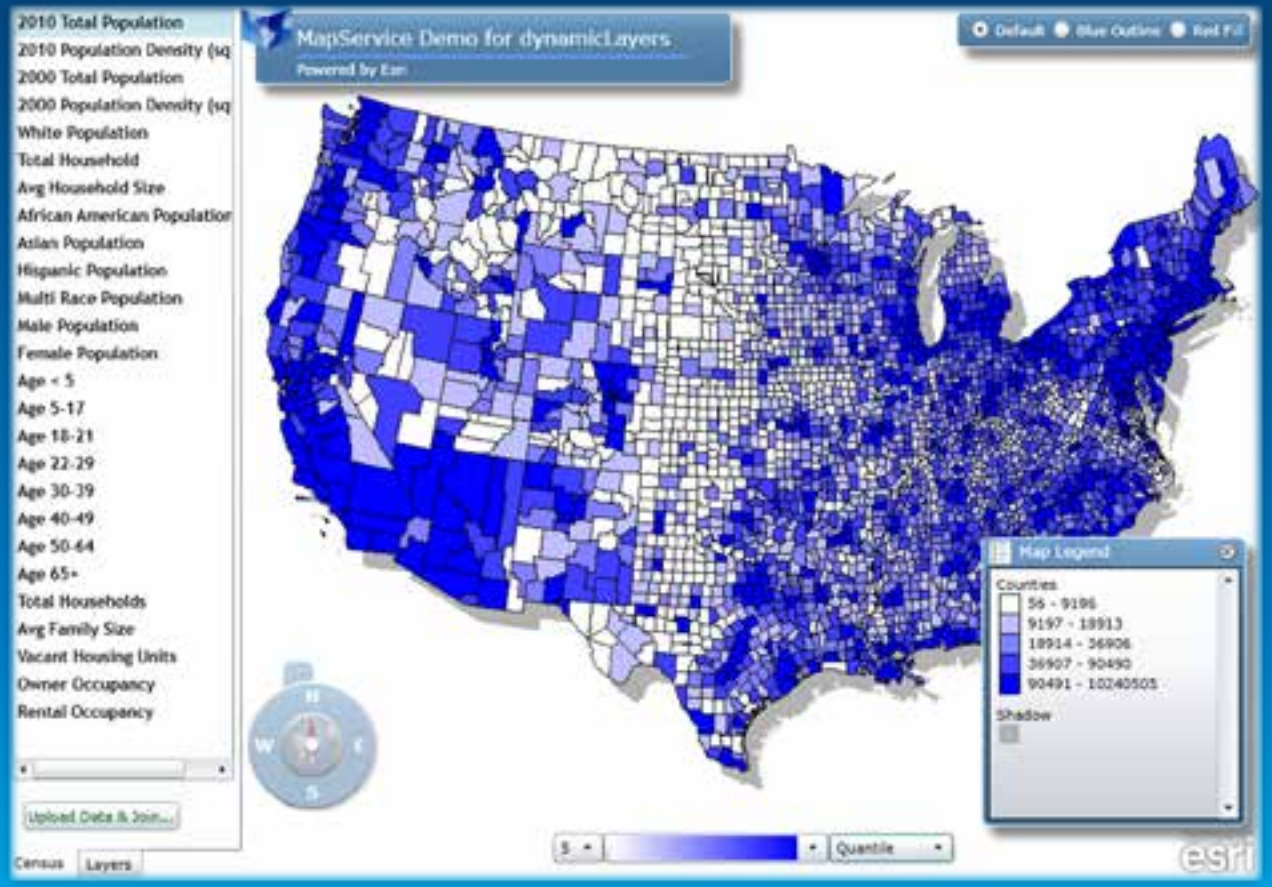
How to enable dynamicLayer?
Change layer's renderer
Add new layer
Use client side data with map service
Query layer



Enabling Dynamic Layers



Demo #1: Modify Drawing Info



Dynamic Layers: Generate Renderer

REST request http://esriurl.com/5978

```
http://.../MapServer/2/generateRenderer?
classificationDef = {
    "type": "classBreaksDef",
    "classificationField": "POP2007",
    "classificationMethod": "esriClassifyQuantile",
    "breakCount": 5,
    "colorRamp": {
        "type": "algorithmic",
        "fromColor": [255, 255, 255, 255],
        "toColor": [0, 0, 255, 255 ],
        "algorithm": "esriCIELabAlgorithm"
    }
}
```

Dynamic Layers: Update Renderer

REST request http://esriurl.com/5979

```
http://.../Census/MapServer/export?....&
dynamicLayers = [ {
    "source": {
      "type": "mapLayer",
      "mapLayerId": 0
    },
    "drawingInfo": {
      "renderer": {
        "type": "classBreaks",
        "field": "POP2007",
        "classBreakInfos": [ … ]
  }     }  ]
```

Dynamic Layers: Generate Renderer

JavaScript API

http://esriurl.com/5968

1. var generateRenderer = new esri.tasks.GenerateRendererTask("http://serv../cens/MapServer/2");

2. var params = new esri.tasks.GenerateRendererParameters();
   params.classificationDefinition = classDef;

3. generateRenderer.execute(params, applyRenderer, errorHandler)

Dynamic Layers: Update Renderer

JavaScript API code

http://esriurl.com/5973

1. `generateRenderer.execute(params, applyRenderer, errorHandler);`

```
function applyRenderer(renderer) {
    var drawingOptions = new
    esri.layers.LayerDrawingOptions();
2   drawingOptions.renderer = renderer;
    optionsArray[2] = drawingOptions;
    usaLayer.setLayerDrawingOptions(optionsArray);
    usaLayer.show();
}
```

Demo #2: Add New Layer

Dynamic Layers: Add Layer from Registered Workspace

REST request http://esriurl.com/5980

```
http://.../USA/MapServer/export?....&
dynamicLayers = [ {
        "id": 104,
        "source": {
           "type": "dataLayer",
           "dataSource": {
              "type": "table",
              "workspaceId": "MyDatabaseWorkspaceIDSSR2",
              "dataSourceName": "ss6.gdb.Lakes"
           }
        },
        "drawingInfo": {…}
} ]
```

Dynamic Layers: Add Layer from Registered Workspace

JavaScript API code

http://esriurl.com/5974

1

```
var dynamicLayerInfos =
usaLayer.createDynamicLayerInfosFromLayerInfos();
```

2

```
var dataSource = new esri.layers.TableDataSource();
dataSource.workspaceId = "MyDatabaseWorkspaceIDSSR2";
dataSource.dataSourceName = "egdb.DBADMIN.USLakes";
var layerSource = new esri.layers.LayerDataSource();
layerSource.dataSource = dataSource;
```

3

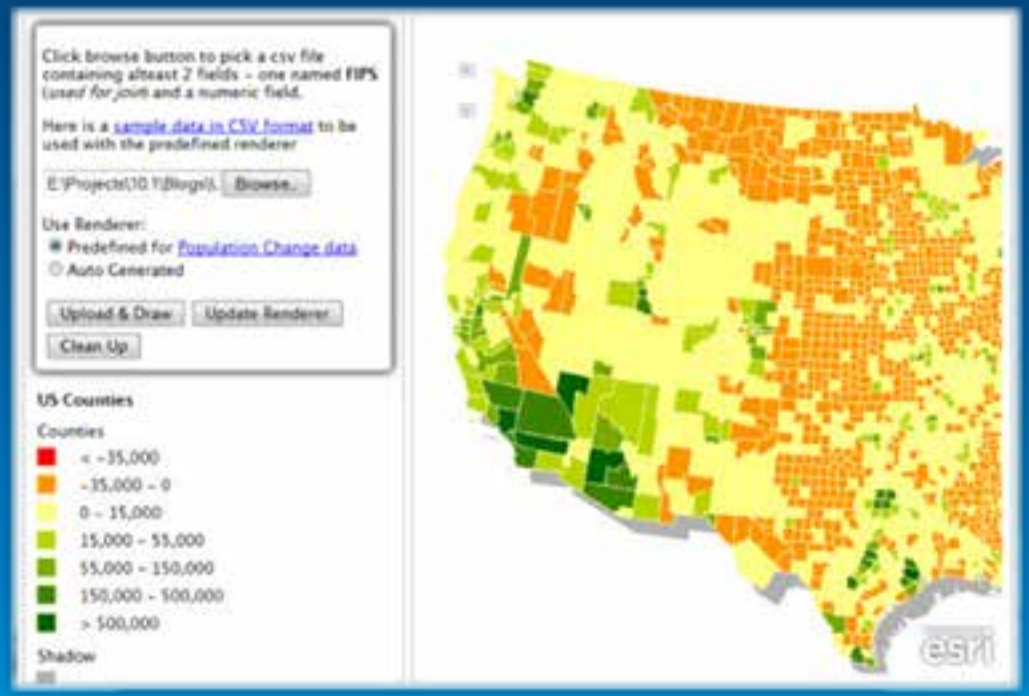
```
var dynamicLayerInfo = new esri.layers.DynamicLayerInfo();
dynamicLayerInfo.source = layerSource;
```

4

```
dynamicLayerInfos.splice(0, 0, dynamicLayerInfo);
usaLayer.setDynamicLayerInfos(dynamicLayerInfos);
```

Demo #3: Use Client Side Data

Blog: http://esriurl.com/5993



Dynamic Layers: Add Query Layer

REST request

http://esriurl.com/5982

```
http://.../USA/MapServer/export?....&
dynamicLayers = [ {
   "source": {
      "type": "dataLayer",
      "dataSource": {
         "type": "queryTable",
         "workspaceId": "MyDatabaseWorkspaceIDSSR2",
         "query": "SELECT * FROM ss6.gdb.Lakes",
         "oidFields": "objectid",
         "geometryType": "esriGeometryPolygon",
         "spatialReference": { "wkid": 4326 }
      } },
   "drawingInfo": {...} }  ]
```

Dynamic Layers: Add Query Layer

JavaScript API code

http://esriurl.com/5977

1

```
var dynamicLayerInfos =
usaLayer.createDynamicLayerInfosFromLayerInfos();
```

2

```
var queryDataSource = new esri.layers.QueryDataSource();
queryDataSource.workspaceId = "MyDatabaseWorkspaceIDSSR2";
queryDataSource.query = "SELECT * FROM ss6.gdb.Lakes";
queryDataSource.oidFields = ["objectid"] ;
queryDataSource.geometryType = "polygon";
queryDataSource.spatialReference = new esri.SpatialReference({wkid:4326});
```

3

```
layerSource.dataSource = queryDataSource;
var dynamicLayerInfo = new esri.layers.DynamicLayerInfo();
dynamicLayerInfo.source = layerSource;
```

4

```
dynamicLayerInfos.splice(0, 0, dynamicLayerInfo);
usaLayer.setDynamicLayerInfos(dynamicLayerInfos);
```

SQL Query to Compute Population Mean Center

```
select 1 as oid,
        geometry::Point(
                sum(a.shape.STCentroid().STX * b.Yr_1930) / sum(b.Yr_1930),
                sum(a.shape.STCentroid().STY * b.Yr_1930) / sum(b.Yr_1930),
            '102008') as shape
from STATES as a
        inner join
            USPOP1900TO2013 as b
        on a.STATE_ABBR = b.STATE_ABBR
```

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