# Extending ArcGIS Enterprise: Developer Technologies and Webhooks

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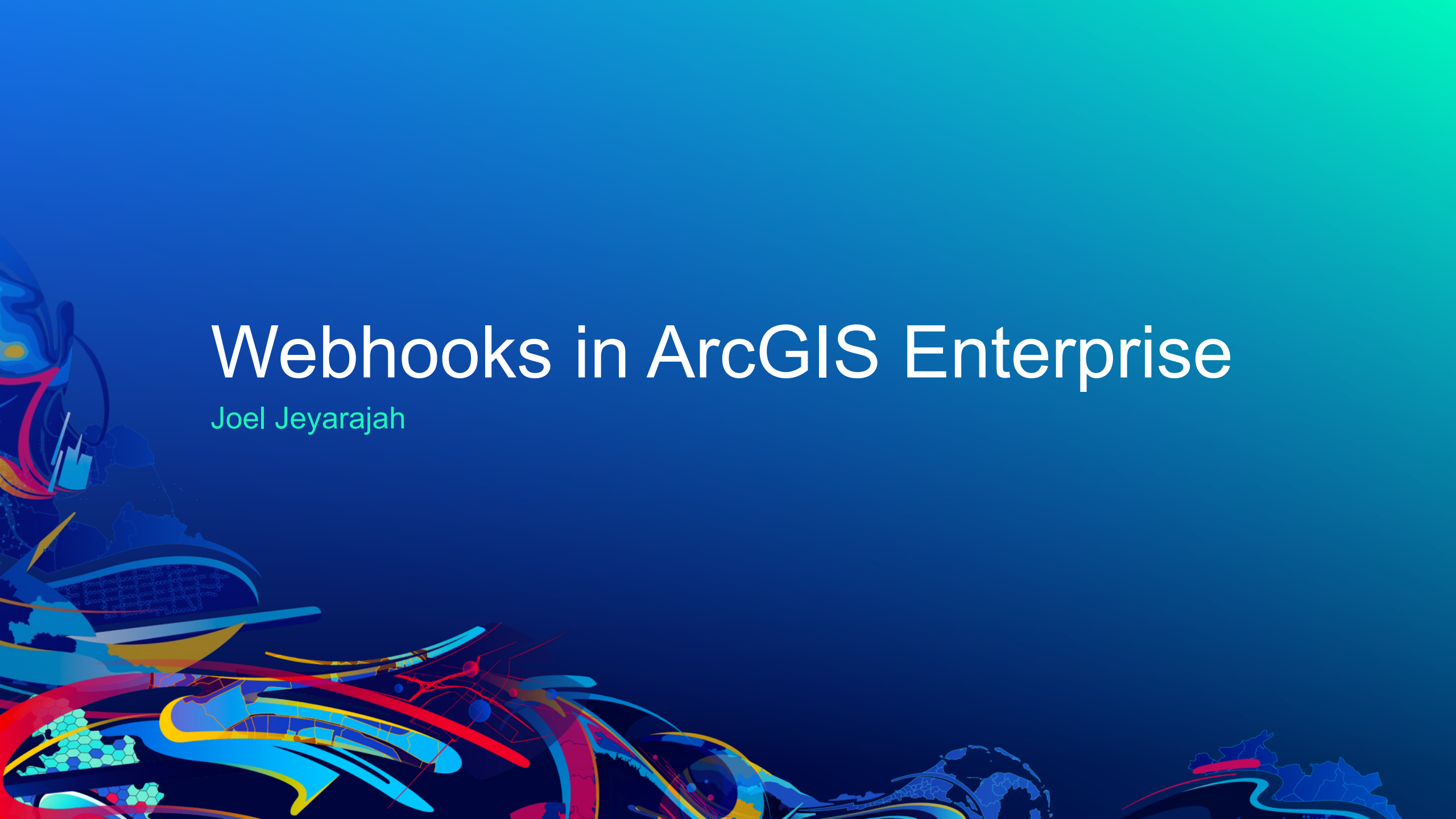
*2021 ESRI DEVELOPER SUMMIT*

# Session overview

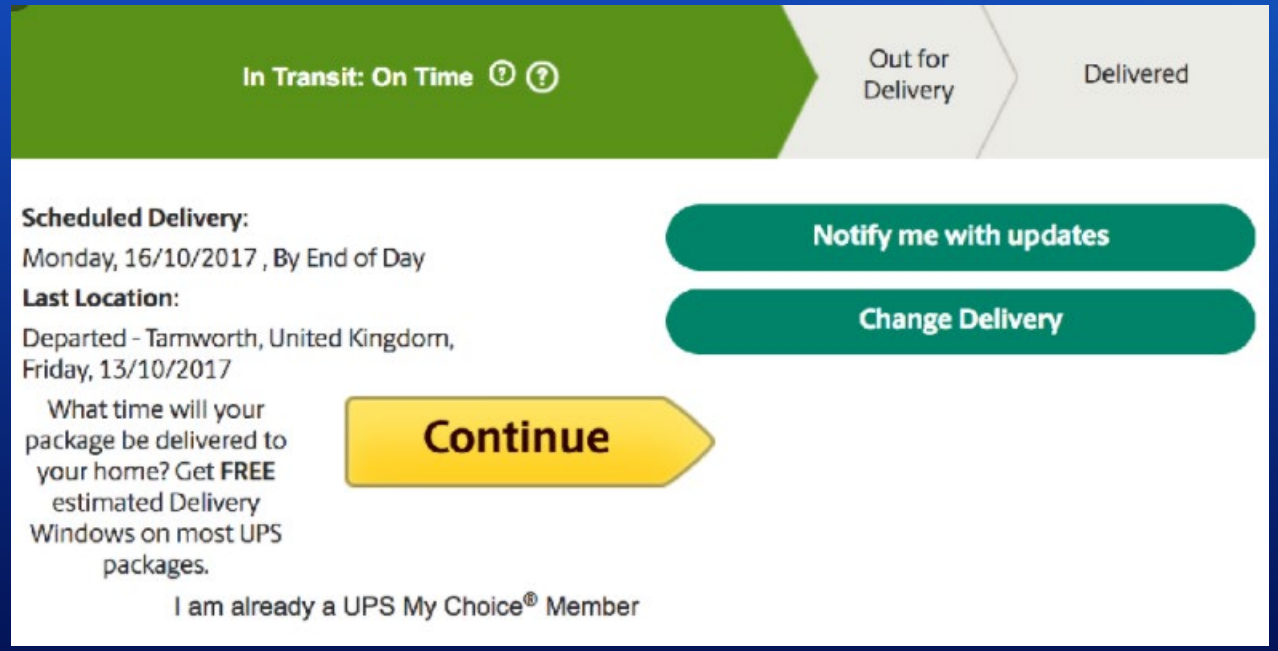
- **Introduction to webhooks in ArcGIS Enterprise**
  - What is a webhook?
  - Advantages of using them
  - Key terms
  - Demo
  - What's next and Resources
- **Overview of ArcGIS Enterprise SDK**
  - Overview of ArcGIS Enterprise SDK
  - Server Object Extension (SOE)
  - Server Object Interceptor (SOI)
  - What's new with SOEs and SOIs in 10.8.1

# Webhooks in ArcGIS Enterprise

Joel Jeyarajah

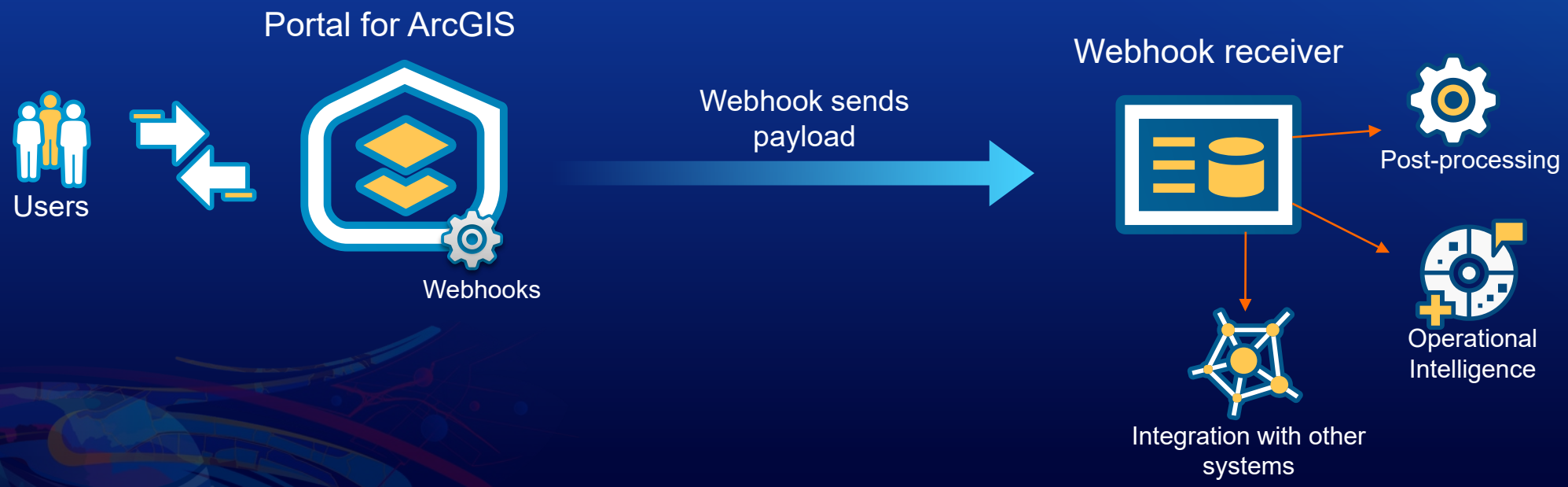


# Don’t call us, we’ll call you



# What is a webhook?

- **A webhook is an ArcGIS Enterprise capability that automatically provides other applications with event-driven information, delivered through an HTTPS request (POST)**
- **They can be used to create automated and integrative workflows, adding new extensibility to ArcGIS Enterprise.**



# Advantages of using webhooks

- **More efficient than polling**

- **Allows you to create custom event-driven workflows, that can be integrated across multiple systems.**
- **Creates new and more efficient opportunities for automation.**

# Key Terms: Trigger event

- **This is the operation you set to trigger your webhook.  For example, you can configure your webhook to be triggered when a specific item is updated in your organization, or when an item is shared.  A webhook can have more than one trigger event.**

| Trigger event | URI example |
|---|---|
| All trigger events for all items | /items |
| Add item to the portal | /items/add |
| All trigger events for a specific item | /items/<itemID> |
| Delete a specific item | /items/<itemID>/delete |
| Update a specific item's properties | /items/<itemID>/update |
| Move an item or changing ownership of the item | /items/<itemID>/move |
| Publish a specific item | /items/<itemID>/publish |
| Share a specific item | /items/<itemID>/share |
| Unshare a specific item | /items/<itemID>/unshare |

# Key Terms: Trigger event

### Trigger events for Portal users:

| Trigger event | URI example |
|---|---|
| All trigger events for all users in the portal | /users |
| Add user to the org | /users/add |
| All trigger events associated with a specific user | /users/<username> |
| Delete a specific user | /users/<username>/delete |
| Update a specific user's profile | /users/<username>/update |
| Disable a specific user's account | /users/<username>/disable |
| Enable a specific user's account | /users/<username>/enable |
| Specific user signs in | /users/<username>/signIn |
| Specific user signs out | /users/<username>/signOut |

### Trigger events for Portal groups:

| Trigger event | URI example |
|---|---|
| All trigger events for all groups | /groups |
| Add group | /groups/add |
| All trigger events for a specific group | /groups/<groupID> |
| Update a specific group | /groups/<groupID>/update |
| Delete a specific group | /groups/<groupID>/delete |
| Enable **Delete Protection** for a specific group | /groups/<groupID>/protect |
| Disable **Delete Protection** for a specific group | /groups/<groupID>/unprotect |
| Invite a user to a specific group | /groups/<groupID>/invite |
| Add a user to a specific group | /groups/<groupID>/addUsers |

# Key Terms: Payload

- Once a webhook is triggered, a payload is delivered to the specified payload URL in JSON format.  Each event follows a similar JSON schema with information that is relevant to the event

```
{
  "info" : {
       "webhookId" : "b1280bce338e4a96a981b09c50ee409c",
       "webhookName" : "Myhook",
       "portalURL" : "https://dev004029.esri.com/portal/",
       "when" : 1547056298561
  },
  "events" : [{
            "userId" : "4ee8b3d66a2e4da3a56f8d256f1df7ce",
            "username" : "admin",
            "when" : 1547056298554,
            "operation" : "share",
            "source" : "item",
            "id" : "186bad9e3dd847ab9a601b505879f86d",
            "properties" : {
                 "sharedToGroups" : [“Everyone”, “4adc30bb03054812a846fa592de105de”]
}}]}
```

```
{
 "info" : {
     "webhookId" : "b1280bce338e4a96a981b09c50ee409c",
     "webhookName" : "Myhook",
     "portalURL" : "https://FQDNm/portal/",
     "when" : 1547056298561
 },
 "events" : [{
         "userId" : "4ee8b3d66a2e4da3a56f8d256f1df7ce",
         "username" : "admin",
         "when" : 1547056298554,
         "operation" : "share",
         "source" : "item",
         "id" : "186bad9e3dd847ab9a601b505879f86d",
         "properties" : {
             "sharedToGroups" : [“Everyone”, “4adc30bb03054812a846fa592de105de”]
}}]}
```

# Key Terms: Payload URL

- A payload URL must be provided when creating a webhook; this defines where the payload will be delivered.

- Since all payloads are delivered through an HTTPS POST request, the webhook receiver must be configured to communicate over HTTPS and be reachable by the Portal.

- Number of options for how and where a webhook is received:
  - Enterprise SDK sample (Java servlet),
  - Third party services: Microsoft Power Automate, Zapier, IFTTT,  Integromat
  - Custom web servers: Node JS, Python Flask

# Demo:
# Triggering a webhook when content is sent and received via distributed collaboration

# What’s next

## Support for referenced and hosted feature layer editing events

# Resources

- Create a hosted feature service webhook in ArcGIS Online
  - https://www.esri.com/arcgis-blog/products/arcgis-online/sharing-collaboration/how-to-create-a-hosted-feature-service-webhook/
- GitHub repository:
  - https://github.com/Esri/webhooks-samples
- Documentation:
  - https://enterprise.arcgis.com/en/portal/latest/administer/windows/create-and-manage-webhooks.htm
  - https://developers.arcgis.com/rest/users-groups-and-items/webhooks.htm
- Blogs:
  - https://www.esri.com/arcgis-blog/products/arcgis-enterprise/administration/webhooks-dont-call-us-well-call-you/
  - https://www.esri.com/arcgis-blog/products/arcgis-enterprise/administration/webhooks-dev-summit-2019/

# ArcGIS Enterprise SDK – SOE and SOI

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*2021 ESRI*
*DEVELOPER SUMMIT*

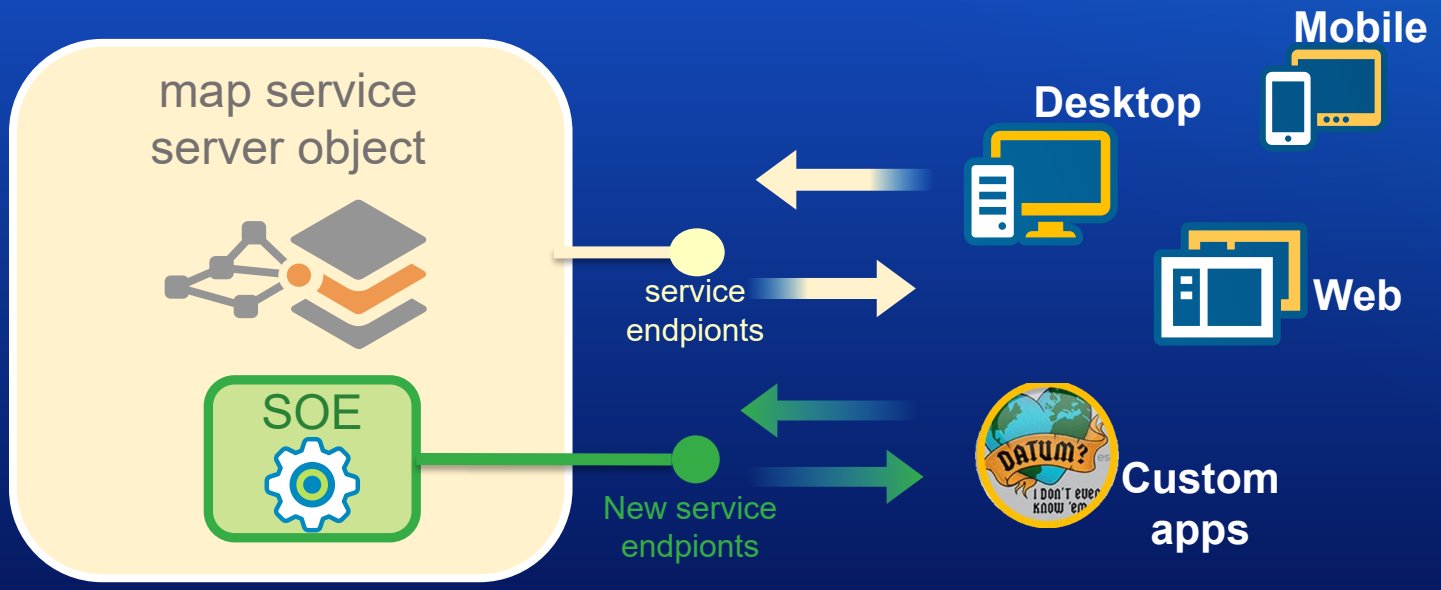
# Agenda

- Overview of ArcGIS Enterprise SDK
- Server Object Extension (SOE)
- Server Object Interceptor (SOI)
- What's new with SOEs and SOIs in ArcGIS Enterprise SDK 10.8.1
  - Demo: Building a Java SOI in Maven framework

# Overview of ArcGIS Enterprise SDK

- ArcGIS Enterprise SDK
  - Tools and APIs for developing SOEs and SOIs for Pro-based services
  - Separate API from ArcObjects SDK
  - Help documentation: https://developers.arcgis.com/enterprise-sdk/

# What is Server Object Extension (SOE)?

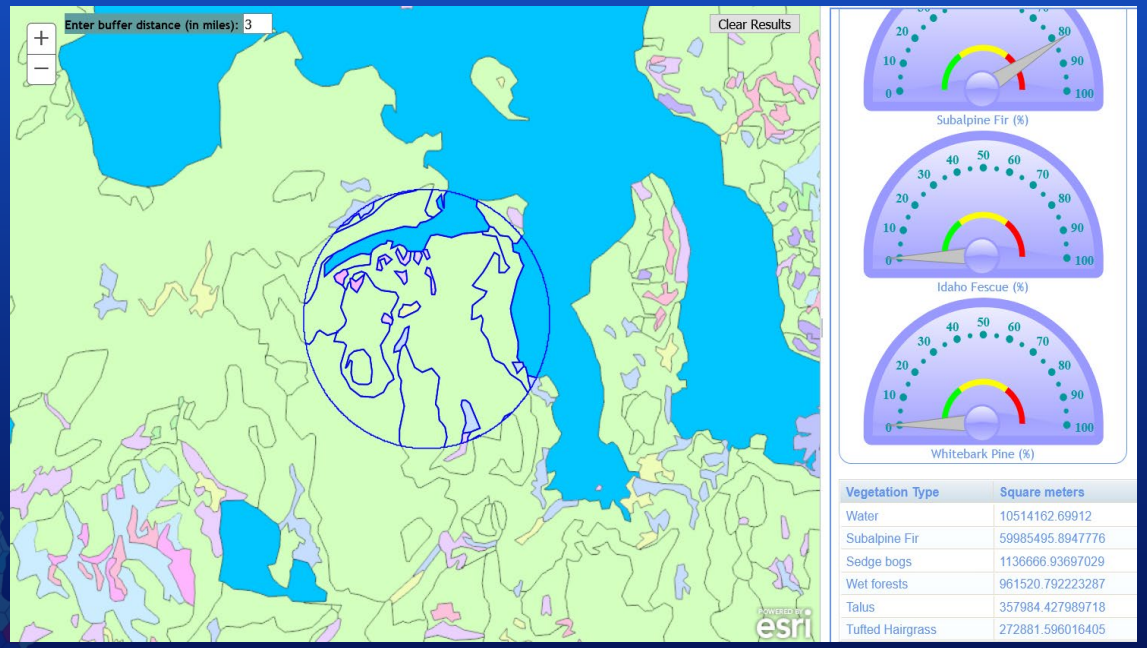


# What can SOE do?

- New service functions are created
  - Customized request parameters for new REST resources/operations, SOAP methods
  - Customized output format: JSON, File
- ESRI libraries to implement custom workflows
  - Geometry API:
    - Spatial analysis, geometry process/calculation, geotransformation
  - Geodatabase API:
    - Direct GDB connections, custom editing and query capabilities
- Streamlined workflow with server-side processing

# SOE use cases

- Custom query, editing, and more




ArcGIS REST Services Directory

Home > services > YellowstoneVegetation (MapServer) > FindNearFeaturesRESTSOE > *Find Near Features*

**Find Near Features( YellowstoneVegetation )**

location {x:547646, y:4910128}

distance 1100

Format (f) html

Find Near Features (GET) Find Near Features (POST)

**displayFieldName**: NAME1

**fieldAliases**:

**OBJECTID**: OBJECTID
**TYPE**: TYPE
**NAME1**: NAME1

**fields**: (3)

**name**: OBJECTID
**type**: esriFieldTypeOID
**alias**: OBJECTID

**name**: TYPE
**type**: esriFieldTypeString
**alias**: TYPE
**length**: 10

**name**: NAME1
**type**: esriFieldTypeString
**alias**: NAME1
**length**: 60

**features**: (5)

**attributes**:
**OBJECTID**: 295
**TYPE**: forest
**NAME1**: Subalpine Fir/Grouse Whortleberry-Grouse Whortleberry Phase

ArcGIS REST Services Directory

Home > services > YellowstoneVegetation (MapServer) > FindNearFe

JSON | SCHEMA

**FindNearFeaturesRESTSOE**

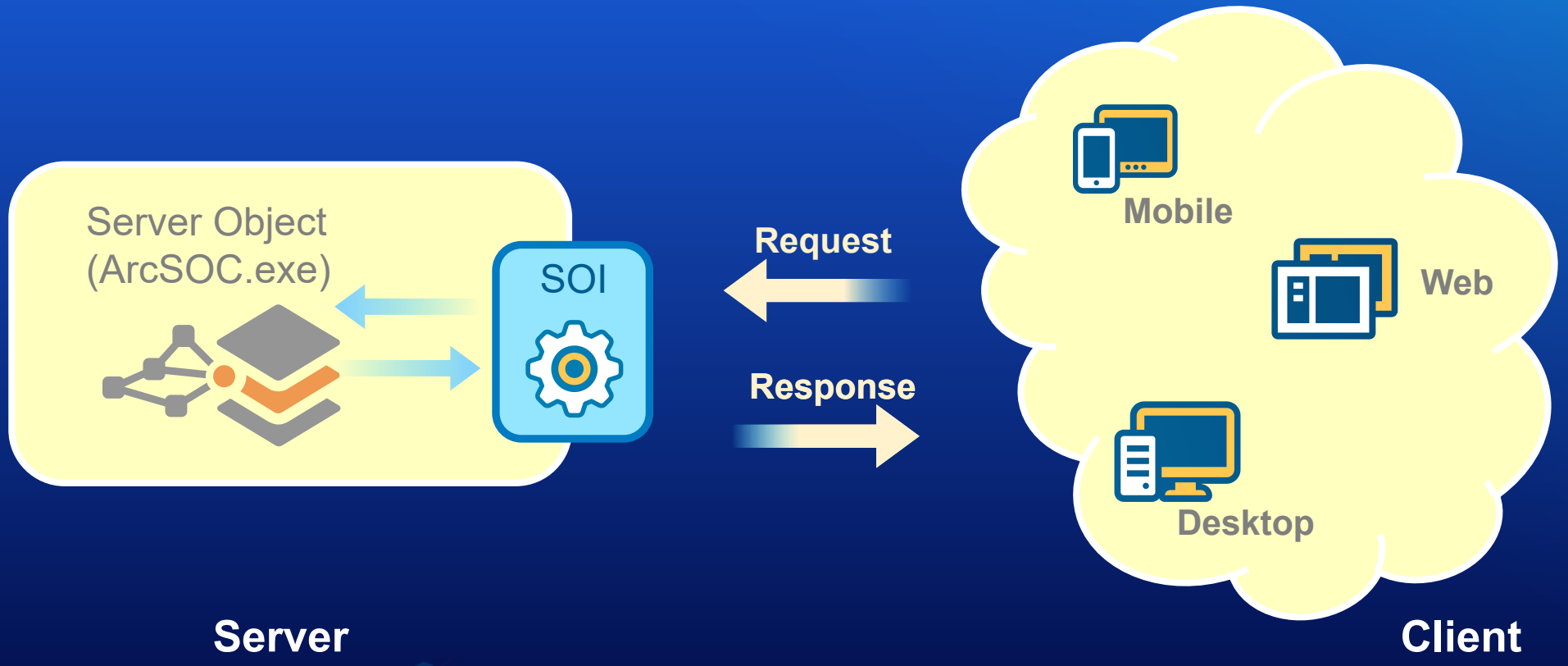
**customLayers**: (1)

**name**: veg
**id**: 0
**extent**:
*Extent*:
XMin: 529238.3124503391
YMin: 4886400.000011086
XMax: 580050.0000496609
YMax: 4931310.999988912
Spatial Reference: 26712

**Child Resources:** Custom Layers

**Supported Operations:** Find Near Features

# What is Server Object Interceptor (SOI)?

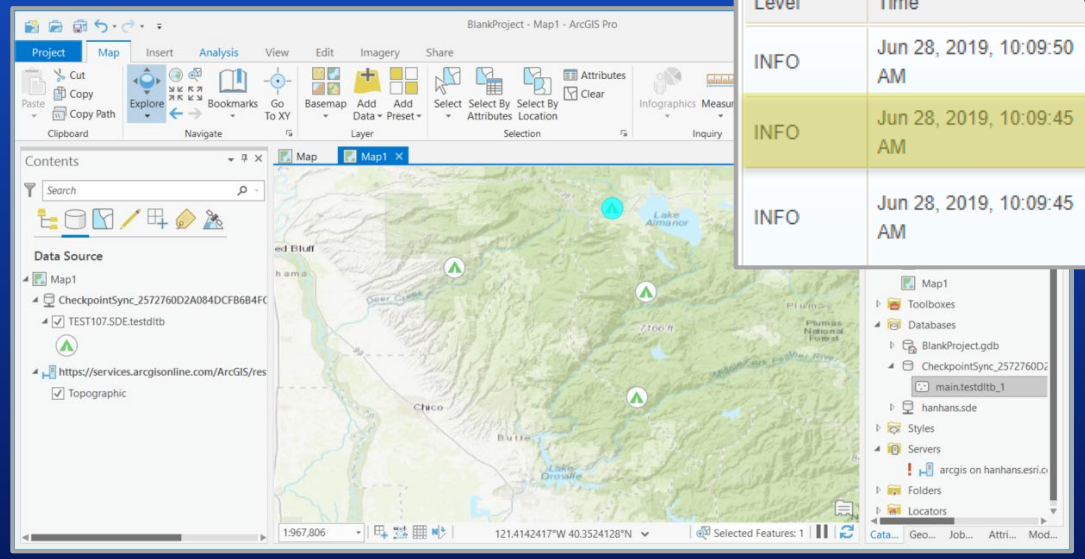


# What can SOI do?

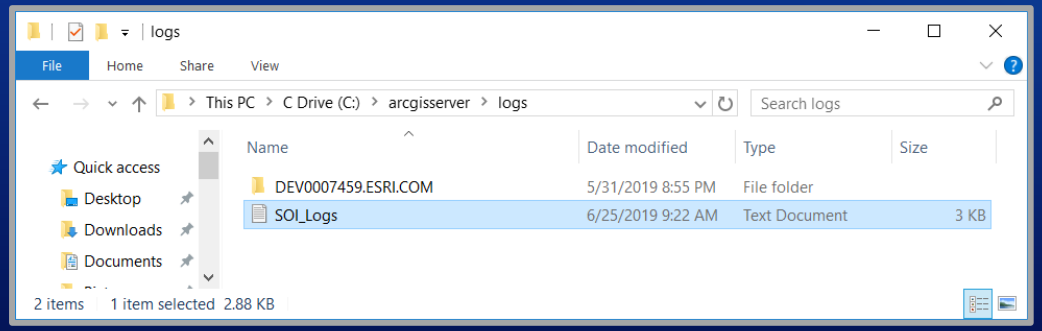
- **SOI's capabilities:**
  - **Read and modify request**
  - **Read and modify response**
  - **Block request/response and return error messages**
  - **Obtain the logged-in user's identity**
- **Work seamlessly with existing ArcGIS clients**
- **Supports intercepting service calls and service extension calls**
  - Map service (REST and SOAP), non-hosted feature service (REST and SOAP), WMS, WFS, WCS, image service (REST and SOAP)*, utility network service*

# SOI use cases

- **Logging, auditing and metering**

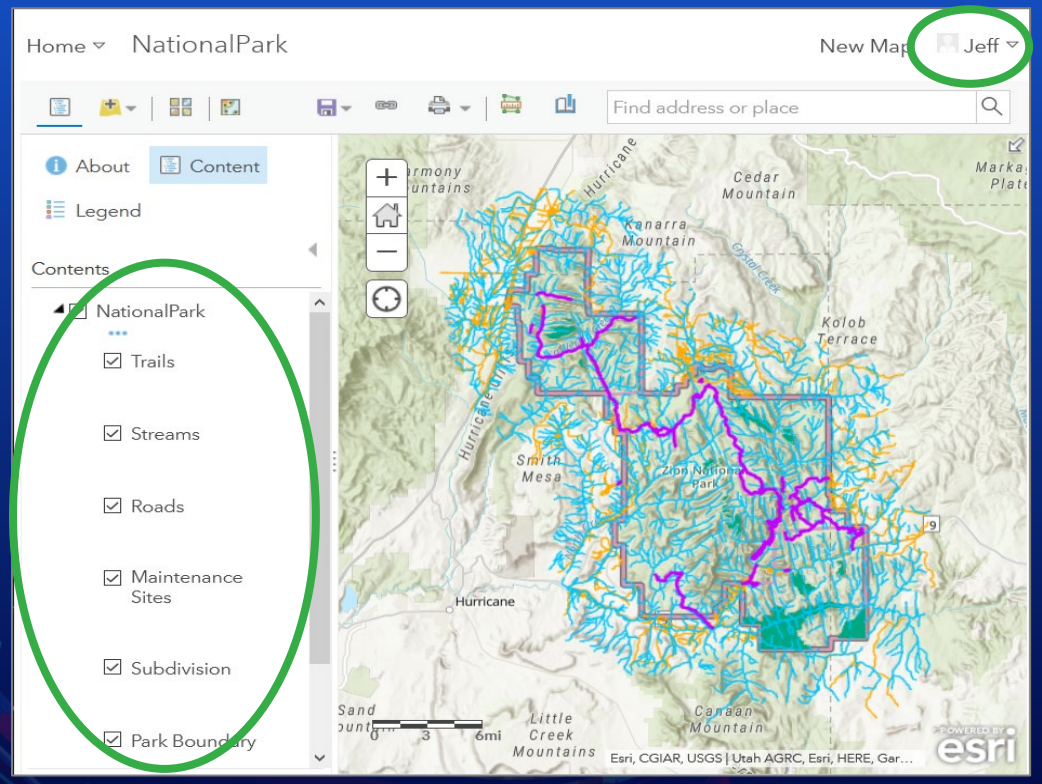


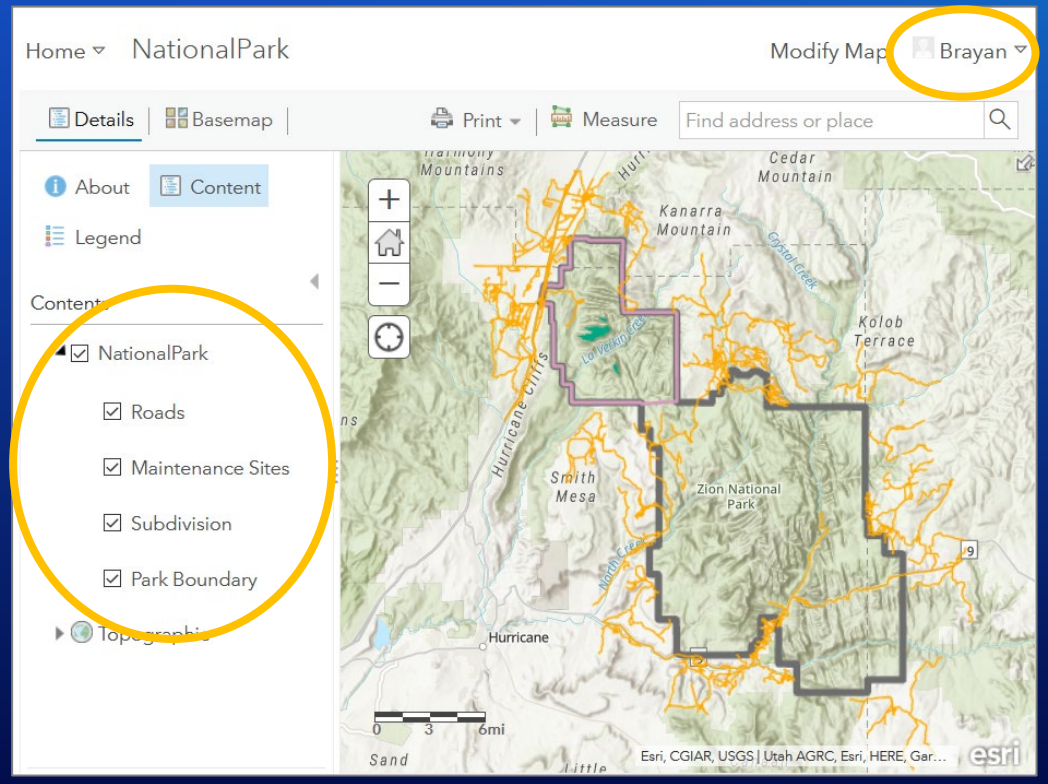

| Level | Time | Message | Source | Method Name |
|---|---|---|---|---|
| INFO | Jun 28, 2019, 10:09:50 AM | Request user: platinum_admin, Service: CheckpointSyncDemo/FeatureServer | Rest | |
| INFO | Jun 28, 2019, 10:09:45 AM | User platinum_admin finished synchronize replica at 6/28/2019 10:09:45 AM | CheckpointSyncDemo.MapServer | SOI Logging |
| INFO | Jun 28, 2019, 10:09:45 AM | Request for the service 'System/SyncToolsEx.GPServer' processed successfully. Response sent to the user '0917b928-c4a3-4b2e-8517-0abee3dea4c7'. | Soap | |



# SOI use cases

- **Fine-grained user access control**



# SOI use cases

- **Data validation**
  **(pre-process request)**
- **Data filtering**
- **Data enrichment**
  **(post-process response)**

Features:

```
[
  {
    "geometry" : {"x" : -118.15, "y" : 33.80},
    "attributes" : {
      "NAME" : "Joe Smith",
      "VALUE" : 94820.37,
      "APPROVED" : "",
    }
  }
]
```

Geodatabase Version Name:

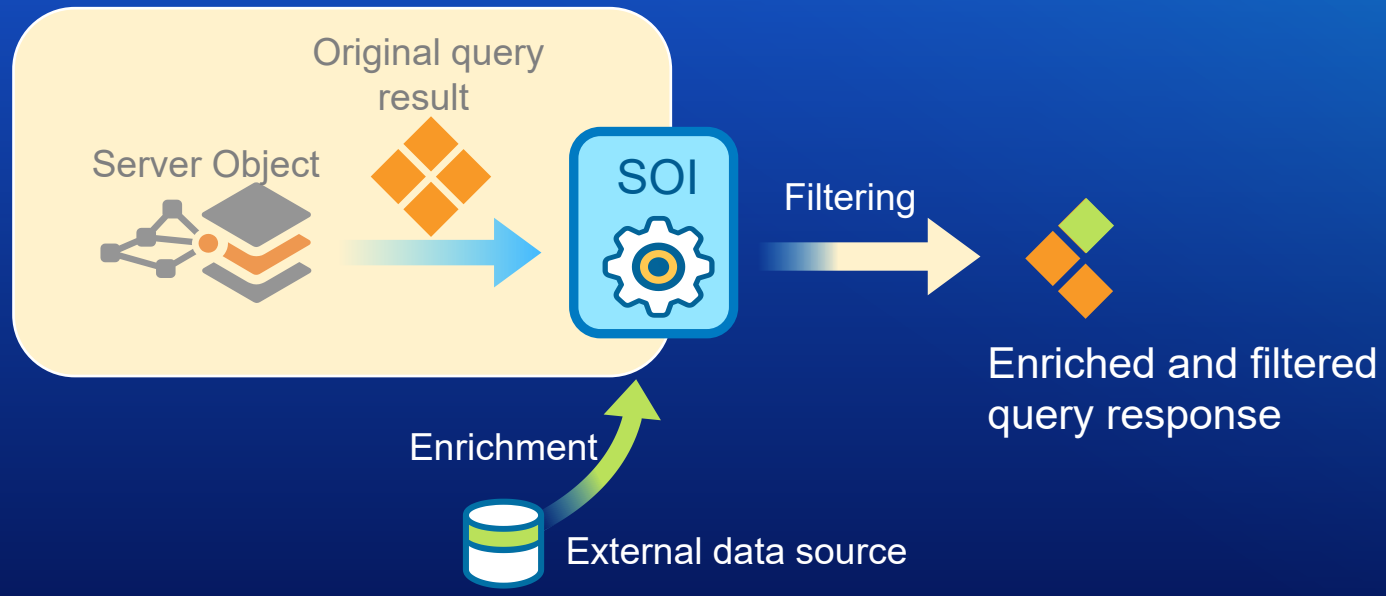
Rollback on Failure: True False

Format: JSON

Add Features

# SOI use cases

- Data validation
  (pre-process request)
- **Data filtering**
- **Data enrichment**
  **(post-process response)**



# What’s new with SOE and SOI in ArcGIS Enterprise SDK 10.8.1

- Maven integration support for SOE and SOI (Java only)
- Shared instance support for SOE and SOI
- Utility network SOE and SOI support
- Image service SOI support

# Maven integration support for SOE and SOI (10.8.1)

- New capabilities provided by the Maven framework
  - More Java IDEs are supported
  - Automatic project build process
  - Built-in unit testing framework by JUnit
  - Project version control and dependency management

# Maven integration support for SOE and SOI (10.8.1)

- Developing Java SOE and SOI in the Maven framework
  - Set up the development environment
    - Install ArcGIS Enterprise SDK
    - Install Java and Maven
    - Configure environment variables
    - Install the Maven artifacts
  - Create a Java SOE/SOI in the Maven framework
    - Using a Java IDE
    - Using the Maven command

# Maven integration support for SOE and SOI (10.8.1)

- Demo:
  - Maven environment
  - Create and build a simple SOI in Maven framework
  - Deploy the SOI on server
  - Test the SOI’s logging function

# Shared instances support for SOE and SOI (10.8.1)

- To allow shared instances support:
  - ArcGIS Server
    - 10.8.1 or later version of ArcGIS Server
  - SOE and SOI
    - 10.8.1 or later version of ArcGIS Enterprise SDK
    - SupportsSharedInstances = true
    - Best practices

```
[ServerObjectInterceptor("MapServer",
    Description = "",
    DisplayName = "ProSOI1",
    Properties = "",
    SupportsSharedInstances = true)]
```

C#

```
@ServerObjectExtProperties(
        displayName = "ServerObjectInt Display Name",
        description = "ServerObjectInt Description",
        interceptor = true,
        servicetype =  "MapService" ,
        properties = "" ,
        supportsSharedInstances = true)
```

Java

# Utility network service SOE and SOI (10.8.1)

- **Supported functions**
  - Access the network schema and properties
  - Query the network topology
  - Manage subnetworks
  - Manage network associations
  - Trace the network - Sample
- **New interfaces and classes**
  - **IBaseNetwork (IDataset), IUtilityNetworkQuery, ITracer, and more.**

# Image service SOI (10.8.1)

- **Service type property**

```
[ServerObjectInterceptor("ImageServer",
    Description = "",
    DisplayName = "ProSOI1",
    Properties = "",
    SupportsSharedInstances = false)]
```

C#

```
@ServerObjectExtProperties(
        displayName = "ServerObjectInt Display Name",
        description = "ServerObjectInt Description",
        interceptor = true,
        servicetype =  "ImageService" ,
        properties = "" ,
        supportsSharedInstances = false)
```

Java

- **REST, SOAP, OGC support**
- **New interfaces and classes**
  - **IImageServer, IImageServiceInfo, IImageServerObjects, IImageServerInit , and more.**

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