Serverless Data Updates in ArcGIS Online/Enterprise

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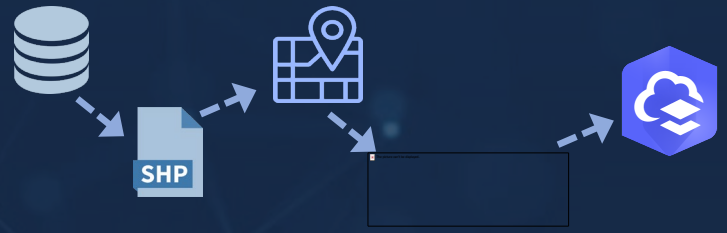
The Problem

- **You have dynamic multi-source data that are not natively read by ArcGIS Online or Enterprise**
  - Non-spatial formats, RDBMS, APIs, etc.
  - Near real-time updates (but not continuously streaming)

Existing Solutions

- (1) Convert data to .shp, geodatabase, etc., (2) stage .MXD or .APRX with symbology to generate service definition, (3) upload to portal as a feature service with arcpy



- GeoEvent Server / ArcGIS Velocity for streaming data

Drawbacks to Existing Solutions

- Manual processes, staging and maintenance of MXD/APRX files
- Physical or virtual servers are required to run update workflows with arcpy or GeoEvent server
- May not require continuous streaming capability

ArcGIS Python API-based Solution

- Python wrapper for ArcGIS REST API
- Allows you to programmatically interact with ArcGIS portals like ArcGIS Online and Enterprise
- Open source
- Licensing is based on ArcGIS portal credentials
- Can be packaged outside a Windows environment

Serverless

- “Serverless computing is a cloud computing execution model in which the cloud provider allocates machine resources on demand, taking care of the servers on behalf of their customers...computing is rather done in short bursts with the results persisted to storage. When an app is not in use, there are no computing resources allocated to the app. Pricing is based on the actual amount of resources consumed by an application.”

  - wikipedia

Serverless

Degree of Stack Abstraction

Public Cloud

Server-based

On-prem Datacenter

- Physical Machines
- Unit of Scale: Server
- Deploy in Months
- Manual Maintenance

- Virtual Machines
- Unit of Scale: Server
- Deploy in Minutes
- Manual/Auto Maintenance

- Containers
- Unit of Scale: Application
- Deploy in Seconds
- Manual/Auto Maintenance

- Serverless
- Unit of Scale: Functions
- Deploy in Milliseconds
- Auto Maintenance
- *Running Workloads Without Managing Server or O.S*

Degree of Focus on Business Logic

Serverless Benefits

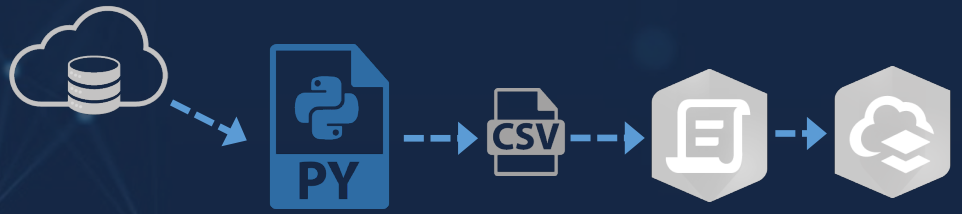
- Wide variety of runtimes can be deployed serverless (node js, python, etc.)
- Less maintenance (no patching, configuring shared system resources, etc.)
- Allows fine grained control of workflows and distributed jobs
- Resources only consumed at runtime (only runs when triggered = low cost)
- Programmatically deployable via Infrastructure as Code (IaC)

Use Case 1

- **A publicly available government API has several endpoints that only return data as JSON, but all the data does include a pair of spatial coordinates**
  - Python script to download data as JSON, convert data to CSV with Pandas and upload to ArcGIS Online, where it's published as a feature service

Use Case 2

- **A cloud hosted RDBMS contains some data you'd like to see on a map, but you don't want to convert it to a geodatabase**
  - Python script to query the necessary tables and export data to CSV and upload to ArcGIS Online as a feature service



Solution

- Automates translation of data and publishing to AGOL & Enterprise
- Runs when data updates
- Leverages cloud-native services including EventBridge & Lambdas
- Requires no Servers (VMs) or software to maintain
- Extremely lightweight and low cost

Demonstration

Limitations & Considerations

- **Doesn’t handle all scenarios or requirements. Limitations:**
  - Limited to 512MB workspace in AWS
  - 15 minute timeout in AWS
  - Won’t handle streaming data
- **Requires data processing and workflow changes**

Future Directions

- **Expand integration with other AWS services:**
  - Secrets Manager
  - Monitoring
  - Etc.
- **Expand Python & Geo-processing functionality**

Thank You!

Learn More:
https://medium.com/new-light-technologies/serverless-arcgis-feature-service-automation-and-iac-88608da82fe5

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