Deploying Distributed Raster Analytics

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The Comprehensive ArcGIS Imagery Platform

Derive actionable information from imagery

System of Insight

Create the applications that enable imagery to be accessible to all that need it in the suitable applications.

System of Engagement

Manage and process imagery into authoritative data.

System of Record

Content from all sources

Professional Imagery & Geospatial Analysts

ArcGIS GIS Server

ArcGIS GeoEvent Server

ArcGIS Image Server

ArcGIS GeoAnalytics Server

ArcGIS Business Analyst Server
What is Raster Analytics?

- The ArcGIS way to create and execute spatial analysis models and image processing chains which leverage distributed storage and analytics

- ArcGIS Enterprise + ArcGIS Image Server
ArcGIS Data Store Setup and Hosting Server

- ArcGIS Data Store = a setup to configure relational database, non-sql (couchdb) or spatial temporal database on hosting server
- Hosting server is used to store hosted feature service
- Some raster analysis tools generate hosted feature service output
Raster Analysis and Image Hosting Server Function

- Federated image server site functions
- Raster Analysis Image Server
  - Processing engine for distributed raster analytics
- Image Hosting Image Server
  - Sharing Input and Output image services for Raster Analytics
- Split roles of server site to avoid resource competition
- Server function can only assigned to one server site
Raster Store

- New ArcGIS server data store type from 10.5
- Raster Store registered to Image Server is for storing output imagery of Raster Analysis tasks
  - Shared file system storage
  - Cloud Object Storage
    - Amazon S3
    - Azure Blob Storage
    - Alibaba/Huawei coming in 10.6.1

Note: register a Cloud Store first then register a Raster Store reference to the Cloud Store
Optimized Cloud Raster Format (CRF)

- **New ArcGIS Raster Dataset format for distributed read/write**
  - Default output imagery format for Raster Analysis tasks
  - Image is split to “bundles” with optimized schema
  - Support cloud storage and file system
  - Published as “hosted” image service
  - Rendered through Raster Rendering service
Distributed Raster Analytics System Services

- Geo Processing service as master
- Image Service as worker
- Image Service for rendering output
Raster Analysis Tools System Services

Note: Generate Raster tool is the generic service tool takes raster function as input to support various analytic workflows.

ref: http://esriurl.com/rasterfunc
Special Configuration for Enterprise Orthomapping

- Orthomapping is a capability of Raster Analysis
- Enable orthomapping capability requires
  - A orthomapping elevation utility service
  - A file share raster store
- Prefer to have
  - Enterprise database as raster store for storing block adjusted mosaic dataset

Orthomapping Elevation

Configure your orthomapping elevation service. Enter the URL of your service.

http://rais.dev.geocloud.com/arcgis/rest/services/Hosted/WorldSRTM90m/ImageServer

Example: https://webadapter.domain.com/arcgis/rest/services/folder/serviceName/ImageServer
<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raster Analysis</td>
<td>Optionally choose one of your servers to act as your portal's Raster Analysis Server.</td>
<td>rais.dev.geocloud.com/arc</td>
</tr>
<tr>
<td>Image Hosting</td>
<td>Optionally choose one of your servers to act as your portal's Image Hosting Server.</td>
<td>No Image Hosting Server</td>
</tr>
</tbody>
</table>
Deployment in the Cloud

Jie Zhang
Enterprise + ArcGIS Server + Image server + RDS in AWS

- Used when we need to do raster analytics
- Mosaic datasets sit in Postgres (RDS)
- All server machines are in cluster
- Config store is on a different ec2 machine
- Different Stack for Dynamic services and raster analytic

Base Enterprise

Elastic IP for Portal

S3 Storage User Raster Store, zip, fgdb

Federated with Portal

Imagery S3 Storage

Elastic Load Balancer

Dynamic Image Services

Image Server

Auto Scaling group

Configure Store

Raster Analytics

EC2

Image Services

Image Server

Image Services

Image Server

Image Services

EC2

EC2

EC2

Postgres RDS
Deployment Platforms

- **On-premise + network file shared storage appliance**

- **Cloud platform + Cloud Object Storage**
  - Amazon Cloud Formation template
  - ArcGIS Enterprise Cloud Builder CLI for AWS
  - ArcGIS Cloud Builder for Azure

Deploy additional ArcGIS Server deployments

In addition to the base ArcGIS Enterprise deployment, you can add functionality and capacity with additional ArcGIS Server sites.

<table>
<thead>
<tr>
<th>Template Name</th>
<th>Description</th>
<th>Platform</th>
<th>View</th>
<th>Launch</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcGIS GIS Server</td>
<td>This template creates a general purpose GIS Server site, or GeoAnalytics Server site, or RasterAnalytics Server site that you can federate with the portal in your base ArcGIS Enterprise deployment. You just need to use different Server license file to deploy different Server sites. ReadMe</td>
<td>Windows 2016</td>
<td>View</td>
<td>LAUNCH STACK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ubuntu 16.04 LTS</td>
<td>View</td>
<td>LAUNCH STACK</td>
</tr>
</tbody>
</table>

AWS Cloud Formation Template VS. Cloud Builder CLI

- **Highly Customizable**
- **One Run Deployment**
- **Power**
- **Simplicity**
ArcGIS Enterprise Configuration and Enterprise Builder CLI
Jie Zhang
ArcGIS Enterprise Cloud Builder for Azure

- Stand-alone app for both Desktop and Enterprise deployment
- Deployment template for Image Server
- Premium storage account recommended

Install ArcGIS Enterprise Cloud Builder for Microsoft Azure

ArcGIS 10.6 | Other versions

ArcGIS Enterprise Cloud Builder for Microsoft Azure is an application you install on your local Windows machine to deploy ArcGIS Enterprise and stand-alone ArcGIS Server sites on Microsoft Azure. It helps you to extend your Azure implementation to include ArcGIS.

Make sure your local Windows machine meets the following prerequisites, download the installation file, and install.

Deployment Best Practice

- Split Raster Analytic and Image Hosting roles
- Adjust maximum number of processing service instances based on machine specs
- A single raster analysis task is always default to use up to 80% of all the available raster processing service processes
- Shutdown unused services
- Configure local cache folder for each server node for fast read/write of Cloud Raster Format (CRF)
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