Using ArcGIS GeoEvent Processor for Server to Power Real-time applications

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Real-time GIS applications

Agenda

• Why?
• Receiving and Sending Real-time Data with ArcGIS
• Performing Continuous Processing and Analysis with ArcGIS
• Producing Alerts and Features for Real-time GIS applications
Real-time GIS applications

Why?

• Are my field personnel working within the designated project area?
Real-time GIS applications

Why?

• Tell customer when their delivery truck is 15 minutes away.
Real-time GIS applications

Why?

• A police department of a city wants to have a real-time map of where all the police patrols are and their status.

• A utility company wants to visually represent the status of their network with real-time information captured by sensors in the field, and map the location of field crews and their status.

• An organization wants to publish a map that accurately shows the current weather status and pollution levels across the country.

Applications

Mobile
Desktop
Web
Runtime
Real-time GIS applications

Challenges

#1  How do I connect real-time data to my applications?

#2  How do I perform analysis on real-time data?

#3  How do I get real-time data to those who need it?

To meet these challenges we needed to enhance the ArcGIS Platform.

Introducing …
ArcGIS Server supports Real-time Processing
GeoEvent Processor integrates and exploits Real-time data

- GeoEvent Processor is an extension for ArcGIS Server that
  - receives real-time streaming data from sensors
  - performs continuous processing & analysis
  - produces alerts and features for those who need it where they need it
Receiving Real-time data

**Input Connectors**

- Users can easily integrate real-time data with ArcGIS by using a **Connector** that meets their needs.
Receiving Real-time data

Input Connectors

- Users can easily integrate real-time data with ArcGIS by using a Connector that meets their needs.

Diagram:

- Real-time data flows into ArcGIS for Server
- ArcGIS for Server sends data to GeoEvent Processor
- GeoEvent Processor can receive data from:
  - Receive from a Socket
  - ws:// Receive from a Web Socket
  - http:// Receive on a REST Endpoint
  - Receive RSS
Receiving Real-time data

Input Connectors

- Users can easily integrate real-time data with ArcGIS by using a Connector that meets their needs.

- ArcGIS for Server
- GeoEvent Processor

Real-time data

- Receive from a Socket
- ws:// Receive from a Web Socket
- [http://] Receive on a REST Endpoint
- Receive RSS
- Watch a folder for new Files
- Poll an ArcGIS Server
- [http://] Poll an external website
Receiving Real-time data

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Receiving Real-time data

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Input Connectors

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Demonstration
Receiving Twitter

Receive Tweets
Connects to the Public Twitter API and receives Tweets based on profiles that you want to follow, terms you want to track, and within a location of interest.

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Count</th>
<th>Rate (over last 5 mins)</th>
<th>Max Rate</th>
<th>Time Since Last</th>
</tr>
</thead>
<tbody>
<tr>
<td>twitter-in</td>
<td>STARTED</td>
<td>2471</td>
<td>18.04/sec</td>
<td>18.15/sec</td>
<td>00:00:00</td>
</tr>
</tbody>
</table>
Sending Real-time data

Output Connectors

- Users can easily send resulting streams to those who need it where they need it using Connectors.
Sending Real-time data

Output Connectors

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Sending Real-time data

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Sending Real-time data

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Sending Real-time data

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Sending Real-time data

Output Connectors

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Performing Continuous Processing and Analysis

GeoEvent Services

- A **GeoEvent Service** configures the flow of GeoEvents,
  - the **Filtering** and **GeoEvent Processing** steps to perform,
  - what input(s) to apply them to,
  - and what outputs(s) to send the results to.
Demonstration
Twitter Monitor
Performing Continuous Processing and Analysis
Twitter Monitor Demonstration

ArcGIS for Server with GeoEvent Processor

- twitter-in
- geolocated = true
- tweets-feature-service-out
- tcp-text-out

Operations Dashboard for ArcGIS
ArcGIS Online / Portal
- twitter operation view
- twitter web map
Real-time GIS applications
Asset Monitor application

Assets

ArcGIS for Server
- Features

GeoEvent Processor
- Vehicle Monitoring
- Excessive Speed Monitoring
- Dangerous Area Monitoring
- Proximity Monitoring
- Territory Monitoring

Alerts

Asset Monitoring

Operation View
Demonstration

Asset Monitoring
Performing Continuous Processing and Analysis
Asset Monitor Demonstration

ArcGIS for Server with GeoEvent Processor

**asset-AssetMonitor (GeoEvent Service)**
- tcp-text-in
- Speed Monitoring
- tcp-text-out
- Panic Monitoring
- asset-feature-service-out
- alert-feature-service-out

**AmbulanceMonitor/1 “Vehicle”**

**AmbulanceMonitor/0 “Alerts”**

**asset-DangerousAreaMonitor (GeoEvent Service)**
- tcp-text-in
- Dangerous Area Monitoring
- alert-feature-service-out

**asset-HospitalArrivalMonitor (GeoEvent Service)**
- tcp-text-in
- Hospital Proximity
- alert-feature-service-out
- email-out
- text-message-out
GeoEvent Processor

**Items**

- **Inputs and Outputs** are created from Connectors
  - **Inputs** receive real-time streaming data from sensors
  - **Outputs** send resulting streams to those who need it where they need it

- **GeoEvent Services** configures the flow of GeoEvents,
  - the *Filtering* and *GeoEvent Processing* steps to perform,
  - what input(s) to apply them to, and what output(s) to send the results to.
Real-time GIS applications
Connecting Real-time data to Local Feature Services

ArcGIS for Server
GeoEvent Processor
GeoEvent Services
Filters
Processors

Your Dashboards
Operations Dashboard for ArcGIS

ArcGIS Online / Portal
operation view
web map

Your Applications
Web APIs
JavaScript
Flex
Silverlight/WPF

Mobile GIS
iOS
Android
Windows Phone

Runtimes
Windows Store
Mac OS X
Java
Qt

Real-time data

Update a Feature
Add a Feature

feature layers
Real-time GIS applications
Connecting Real-time data to Remote Feature Services

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Real-time data

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- Windows Store
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- Qt

GeoEvent Services
Update a Feature
Add a Feature
Real-time GIS applications
Connecting Real-time data to ArcGIS Online Feature Services

ArcGIS for Server
GeoEvent Processor
GeoEvent Services
Filters
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Your Applications
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Real-time data

Operations Dashboard for ArcGIS

Your Dashboards

ArcGIS Online / Portal
- operation view
- web map
- feature layers

Update a Feature
Add a Feature
GeoEvent Processor Administration

REST Admin API

- A complete set of REST administrative endpoints are exposed that enable you to manage the server programmatically:
  - ‘Manager’ and ‘Designer’ exclusively use the REST Admin API. Therefore, everything you can do in ‘Manager / Designer’ you can also do via REST.
Demonstration

REST Admin API
Real-time GIS applications
Connecting Real-time data to Big Data stores

• You can configure a GeoEvent Service to:
  - Write to a Hadoop Distributed File System (HDFS)
  - Write to a MongoDB Document Store

• Big Data: Using ArcGIS with Apache Hadoop
  - Thursday, 10:00-11:00am, Catalina/Madera
ArcGIS GeoEvent Processor for Server

Summary

• GeoEvent Processor for Server enables you to take advantage of the ‘Real-time GIS’ pattern.

• It provides ArcGIS users with exciting new capabilities to:
  - Monitor real-time events by connecting Features to Sensors
  - Perform continuous processing and analysis
  - Alert users when something of interest happens

• Developers can:
  - Utilize GeoEvent Processor to power their Real-time GIS applications.
  - Extend the GeoEvent Processor with new Connectors and Processors
    - Tuesday 4:00-5:00pm, Demo Theater 2 – Oasis 1

• Will be released as an extension to ArcGIS 10.2 for Server
  - Preview / Early Adopter Program will be available mid-April.
  - [http://www.esri.com/GeoEvent](http://www.esri.com/GeoEvent) - Interest Form
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http://esriurl.com/survey
Offering ID: 220